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Economic competencies needed and possessed by farmers in Hyuderabad District, Sind, Pakistan

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Economic competencies needed and possessed by farmers in Hyderabad District, Sind, Pakistan

by

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CHAPTER I. INTRODUCTION

Pakistan is an interesting landmass of diversified relief, with its vast fertile plains of the Indus basin, rocky expanse of plateaus of the south-west and sky-high snow-clad majestic mountains of the north. On its east and south-east lies India, on the north and north-west is Afghanistan, on the west, Iran, and in the south, the Arabian Sea. It has a common frontier with China along its Gilgit Agency and Baltistan. The country comprises the provinces of Punjab, Sind, Baluchistan and North-West Frontier. The total area of Pakistan is 803,950 square kilometers. According to the 1981 census, the total population of Pakistan was 83.78 million.

The main occupation of our rural population is agriculture. The rural economy, like that of many other developing countries, is predominantly agricultural in character. In addition to providing support to nearly 17 million people in the rural labor force, the agriculture sector contributes 30 percent of GDP and 40 percent to foreign exchange earnings. Rural development is thus concerned with tackling problems such as population pressure, income disparity, inadequate job opportunities, lack of essential infrastructure and communication facilities and other services like health, education, drinking water supply, and sanitation. These problems can be overcome by improving the standard of living of the rural

masses through upgrading their economic activities (Sayed, 1982).

Land resources form the most important natural wealth of the country and their proper utilization is a matter of utmost concern to its people. The utilization of the land according to its use capability ensures that this resource is utilized to the best advantage. Its improper use leads to wastage and can lead to progressive deterioration and loss of productivity of this vital resource.

Increased agricultural production is a problem of bringing about a proper utilization of soil, water, plants and people. The agriculture problem is not one of maintaining but of developing soil productivity to the highest practical level, and of maintaining it at that level. The farmers need all the help which science and research can afford, and which organization, education and training can bring within their reach.

Agricultural efficiency and productivity depend largely upon the input and investment in agriculture and in the methods of production. Progressive agriculture demands improvement in input and technology, irrigation, improved seeds, chemical fertilizers, land reclamation and soil conservation, plant protection, mechanization, and favorable institutional and organizational structure. There is no doubt that these

inputs play an important role, but the farmer, who is the major decision maker, has to decide:

-what to produce

-how much to produce

-when to produce

-how to produce.

These decisions are not that easy. Decisions cannot easily be changed in the agricultural field. Therefore, farmers need technical and economic competencies to make wise decisions. The complexity of the farmer's decisions was referred to by Heady and Jensen (1951, p. 420):

> For largest profits a farmer must use each unit of resources where it will bring him the greatest return. He must decide whether to invest scarce capital in legume seed, fertilizer, brood sows, machinery, or some other alternative. He must decide whether a day of labor or an acre of land will bring greatest returns if used to grow alfalfa, clover, corn, soybeans, wheat or some other crop. He must make similar choices between crop and livestock enterprises. He must choose between different kinds of livestock. Rotations and cropping systems also must be considered in this light. The problems of the most desirable rotation or of the most profitable ration to be fed a given class of livestock are not distinct and separate problems. They are problems that must be considered together in order to get maximum farm profits.

As defined in the education dictionary economic competency is the ability of an individual to practice effectively the business activities of everyday living. According to Hopkins and Heady (1962, p. 3):

> Modern farming requires business ability and methods for success. It is a competitive industry, and it will grow increasingly so. Farmers who are unable to

> apply business methods and efficient management will find that agriculture is not the place for them.
>
> ...so today's farmer is professionally oriented man operating his farm as a highly capitalized business rather than a way of life.
>
> Organized thus, it needs all of the records of market transactions, both purchases and sales, and all the tools of decision making which go along with a business or profession.

Therefore, the economic decisions to be taken by the farmer are very important in the farming business. These wise decisions result in higher productivity which eventually lead to self sufficiency in the food production. The analysis of economic competencies should be useful in planning instructional programs related to the crop production and in agricultural research, education and extension.

Statement of the Problem

One of the main problems facing agriculture in Pakistan is low productivity. The vicious circle of poverty in agriculture starts from the point of low agricultural production and follows through with low marketable surpluses, low income, low savings, low investments for land improvement and ultimately ends in low agricultural production. Each factor reacts cumulatively upon another in such a way as to keep the vicious circle of poverty intact. Basic factors which account for retarding the growth of agricultural production can be classified under three categories - natural, techno-economic and socio-economic factors. These factors have profound influence on shaping the agricultural policy. However,

a continuous increase in foodgrains production is of utmost urgency.

Population growth has a significant impact on economic development. Additional population, contributing to the labor force, is an asset to the nation for the production of goods and services. However, if the additional population consumes more than what is produced by the additional labor force, it becomes a liability. The growth in numbers is, therefore, conducive to economic development only if additional production exceeds additional consumption, resulting in savings which could form the basis of capital for further economic development. If this does not happen, population growth is detrimental to economic progress (Ali Mohammad, 1978).

Agricultural production is the result of combining land, labor, capital and management resources. The function of labor in production is defined by Hopkins and Murray (1953, p. 100):

> Labor is the active element of production. The forces of nature in and of themselves are seldom of immediate use. In economic production labor is used to make things more useful by changing their form, their location, or their time of consumption. In each case the labor must be partly with the hands and partly with the mind.

Increase in foodgrain production can be achieved in a number of ways. But the most important one is the efforts of farmers, their ability to make decisions wisely and their

knowledge in production and marketing the products efficiently. These could be achieved through research to analyze the economic competencies needed and possessed by farmers and to make recommendations for their training. This situation magnifies the nature of this research initiative.

The farm productivity in developing countries as compared to developed are much lower than it should be. The basic reason of low yield in agriculture is that the farmer does not possess the essential and economic competencies which are required to do the best job. This situation creates the following questions: What competencies do the farmers possess? To what degree do they possess these competencies?

Need for the Study

The need for this study was based on the following considerations:

1. There have been no studies dealing with economic competencies needed by farmers in the Hyderabad District, Sind, Pakistan.
2. Background information is needed by federal and provincial planners for government policies and adult education centers.
3. The data regarding different competencies are required by the agricultural universities in the country for designing curricula and courses.

Purpose and Objectives

The primary purpose of this study was to identify the economic competencies needed and possessed by the farmers in Hyderabad District, Sind, Pakistan.

The specific objectives of the study were:

1. To identify selected characteristics of the farmers and agriculture officers in Hyderabad District, Sind, Pakistan.
2. To determine the degree to which economic competencies are needed and possessed by the farmers.
3. To compare the perceptions of the farmers and agriculture officers regarding the degree of competence needed and the degree of competence possessed by farmers.
4. To compare the degree of competence needed and the degree of competence possessed when farmers are grouped by selected demographic factors.

Limitations of the Study

The following limitations were observed in this study:

1. This study was limited to economic competencies.
2. The population of this study was limited to only one district of Hyderabad Sind, Pakistan.

Definition of Terms

The following terms were defined to provide clarify in understanding the research project:

Ability: A talent, the power to do a special skill.

Agribusiness: The profit-motivated enterprises that involve providing supplies and/or services needed by those engaged in agricultural production, and/or the processing, marketing, transportation, and distribution of agricultural materials and consumer products.

Agricultural occupation: An occupation that requires agricultural knowledge and skills. The primary instructional areas which also serve to classify agricultural occupations are: agricultural production, agricultural supplies and services, agricultural mechanics, agricultural products processing and marketing, ornamental horticulture, agricultural resources, and forestry.

Agriculture officer: A person who works in the department of agricultural extension and whose task is the dissemination of agricultural information to farmers.

District: An administrative unit of government.

Economic competency: The ability of an individual to practice effectively the business activities of the farm.

Economic efficiency: The use of resources in the most efficient manner.

Economics: The social study of the production, distribution, and consumption of wealth.

Farmer: The person who controls the farm land and is responsible for the decision making process affecting the farm.

Management: The job of planning, organizing, and controlling any enterprise.

Marketing: The business activities concerned with conveying goods and services from producers to consumers which include buying, selling, grading, packaging, storing and financing.

Research: A formal, intensive and systematic investigation which employs the scientific or problem-solving method and is directed toward the identification, clarification and/or resolution of a problem.

Taluka: Sub-unit of District.

Statement of Hypotheses

A hypothesis is a contention based on preliminary observation of what appear to be facts, which may or may not be true. The test of hypothesis is in the comparison of the contention thus formulated with the newly and objectively collected facts. If these newly collected facts can be shown to agree with the contention, the contention is retained, that is, the hypothesis is accepted. If the contention and

facts do not agree, the contention is discarded, that is, the hypothesis is rejected (Li, 1964).

The following null hypotheses were formulated for the purpose of the study. The hypotheses were tested for significance at the 0.05 alpha level.

HO1: There are no significant differences in economic competencies needed and possessed as perceived by the farmers.

HO2: There are no significant differences in economic competencies needed and possessed as perceived by the agriculture officers.

HO3: There are no significant differences between the perceptions of the farmers and agriculture officers regarding the importance of economic competencies needed by the farmers.

HO4: There are no significant differences between the perceptions of the farmers and agriculture officers regarding the importance of economic competencies possessed by the farmers.

HO5: There are no significant differences in the perceptions of the farmers regarding the importance of economic competencies needed and possessed when grouped according to:

1) educational level,
2) years of farming experience, and
3) tenancy status.

CHAPTER II. REVIEW OF LITERATURE

The review of literature was organized to include three sections: (1) farmers' education, (2) training of extension personnel, and (3) farmer competency studies.

Farmers' Education

A productive system of agriculture is intrinsic to the economic and sociological development of any nation. In the case of developing nations, it becomes a high priority. In a similar way, education is essential to an efficient and productive system of agriculture. Pakistan is an example of one of the developing nations of the world. Its agricultural technology is largely traditional and inefficient in its methods of growing crops and producing livestock. Its future as a developed nation lies in the development of a system for delivering agricultural education.

Farmers are not familiar with the new technological innovations that could pull them out of their stagnant situation. Educating farmers in new technological innovations appears to be the most effective and rapid means of increasing agricultural productivity and moving the country towards self-sufficiency. But these goals cannot be achieved without effective education for farmers and extension personnel who can lead farmers to modern methods of production.

A great potential exists for increasing the production and income of the farmers with available resources. This

potential can be exploited by improving the management ability of the farmers through education and extension. Basic education is needed to understand, synthesize, and apply the information provided by extension agents. Extension services, especially the quality of such services, should also be strengthened so that the extension agents can guide the farmers according to their environment, resource base, and market, and help them to adjust quickly to changing environments (Ali, 1988).

In developing the rural poor, Schultz (1964) emphasized that the untapped talents and capabilities of the rural people in agriculture were the computer parts for effective modernization of agriculture. He argued that the transformation of agriculture in developing countries depended in large part on investment in human resources, such as the education of peasant farmers regarding agricultural innovations.

Okorie (1974, p. 153) conducted a study to determine the impact of agricultural education on farm production in eastern Nigeria. The recommendations for farmer education programs are summarized as follows:

1) The School of Agriculture should continue to develop and enlarge programs for farmers.
2) The University of Nigeria should take the initiative to provide educational programs for training of young farmers. The training programs should emphasize

courses that will be practical and applicable to the farmers.

3) Programs should be organized on a year-round basis to meet the problems of the farmer. Contact with the farmers should continue to rest heavily with the extension staff.
4) The programs should include group educational projects demonstrations, tours or trips, family events, on-farm instruction as well as instruction in technical agriculture.
5) The programs should emphasize crops and livestock management, family living, money management, marketing, land transactions, machinery management, and record keeping.
6) Demonstration centers, depicting various forms of agricultural practices, should be established in each district.
7) Government should continue to lend its support to the formation of cooperatives by farmers.
8) Incentives should be provided among the farmers. The government should establish methods for recognizing progressive farmers. Agricultural shows should be encouraged on district, zonal, state and national levels.

Regarding the training of rural farm people to better solve agricultural problems, Axinn (1976) explained that a typical rural social system has seven branches which are tied together into a social, political, economic, religious, cultural and physical environment. Citing agriculture as the mainstay of the entire economic system for developing countries, Axinn further emphasized: "it is only through intensive training and education of farmers that the expected change in farmers can be brought about, in order to achieve rural development goals" (Axinn, 1976, p. 7).

As a developing nation, Pakistan has a great number of needs which can only be met by the efficient utilization of her available indigenous human resources. The basic problem which interferes with this realization is not a poverty of resources, but a lack of development of human resources. This form of underdevelopment can, however, be remedied when there are enough people with the necessary attitudes and skills. The channel from which such people will emerge is education.

The major task facing Pakistan is the improvement and extension of education to keep pace with current and future needs. Unlike some of the other industries of the nation, agriculture is the main industry in the country. It has the potential to become extremely complex and technical in many aspects, and so many of the positions within agriculture will

require well-trained employees. As a result, competent and professionally trained agriculturists trained by the agriculture institutions (universities, extension and research) are essential to the socioeconomic well-being of the country.

In the contemporary world, with its complex and varied economic systems, there has been increased recognition of the fact that the true resources of a nation are its human resources. From this standpoint, occupational or vocational education programs are considered to be a form of investment in human capital--an investment which provides comparatively high return to both the individual and society. Educators generally agree that job preparatory education program contribute to individuals becoming both contributing economic producers and responsible members of society (Qaderi, 1977).

In determining the educational needs of the farmer, the program planner should endeavor to be well acquainted with the present level of competence of farmers in farming as a vocation, their attitudes about farming, their farm operating skills, the operating practices employed by the farmers, their economic status, the farming practices peculiar to the usual techniques employed by the farmers and their judgment about their current farming practices (McMahon, 1970; Knox, 1969). Other information necessary for meaningful assessment of educational needs of farmers should focus on what the

desired situation should be. Evidence about desirable farming practices should come from research findings on appropriate farming techniques, value judgment of professionals and alternatives based on economic status, geographical location and opportunities created by government programs and legislation.

The evaluation involves comparison between the present situation and the established criteria. As such, the challenge in assessing the educational needs of a farmer is to compare the present situation with the ideal or desired situation. This process involves judgments. The judgment should show the causes of the present situation and accordingly help programmers in making recommendations aimed at altering the situation to its desired state. These judgments about the suitability of different programs to farmers should be made in consultation with the farmers, as they are the ones to be affected by the change (Boyle, 1981).

A study conducted by Albracht (1982) to identify the educational needs in agriculture for part-time farmers in Kansas served as an example. In his study, a survey of all Kansas Young Farmers in 1982 was implemented. The specific purpose was to assess the needs of agricultural instruction to meet the needs of rural or urban residents who do not depend on their land for major income. The findings revealed that the part-time/small farmers (PT/SF) rated the different

instructional areas as more important for their farm operating success than did the large farmers. This study revealed that the PT/SF rated farm mechanics as the foremost instructional area that the farmers needed. This choice was followed by farm management, crop science, soil science and animal science.

Implications from the Albracht study also emphasized the importance of involvement of farmers in the identification of the instructional areas needed. An important finding of the study by Albracht was that, although the educational needs of PT/SF and large scale farmers might appear to be similar, significant differences existed between the groups.

Training of Agricultural Extension Personnel

This section reviewed the studies of the importance of training of agricultural extension personnel. The training of agriculture extension personnel is directly related to their job of dissemination of knowledge to farmers. The training to these personnel enable them to perform their job effectively.

The extension person is a change agent, educator, analyst, administrator, and resource person. Extension is generally recognized by rural people as an almost indispensable institution (Davis, 1963). Rural farmers look to extension workers and extension institutions as a center for the

improvement of their living. Therefore, according to Davis (1963), one of the major concerns by extension administrators is to determine what professional competencies are most needed by extension workers to perform their mission more effectively. Another important concern is the development and maintenance of the kinds of professional competencies that will make the greatest contribution.

The tasks that an extension worker in a developing nation should be prepared for have been suggested by a number of extension specialists such as Adams (1982) and Rogers (1982). They view an extension officer as more than a person who transmits innovations to the farmers. The list of tasks includes:

1. Working with farmers in identifying problems, developing need for change, and creating a framework for solving problems.
2. Bringing agricultural innovations - new or improved crops, appropriate husbandry, farm tools and machinery and ways of improving livestock - to the farmers.
3. Creating and improving organizations that serve the farmers as cooperatives, the market system, farmers' organizations, credit system.
4. Creating a respect for sound farm management: budgeting, record keeping, proper relationship between inputs and outputs, and marketing strategy.
5. Communicating the farming situation to research organizations, agricultural training institutions, public officials, and the national agricultural agencies.
6. Working with organizations whose activities impact on farm activities.

7. Planning, implementing, and evaluating extension activities.

8. Budgeting for and ethically using extension resources (Ngesa, 1985, pp. 38-39).

Wortman and Cummings (1981) in their book entitled, To Feed This World, have listed the most important competencies that should be possessed by the extension worker. They are as follows:

1. Technical competency: The extension worker must have a basic understanding of agricultural science and be able to conduct field experiments to test whether innovations would be feasible and profitable for the farmer. He must also be able to diagnose common problems and abnormalities and to prescribe proper solutions.

2. Economic competency: He must be able to help farmers estimate the profitability of choices such as combinations of inputs, cropping or animal husbandry practices, or alternative markets.

3. Farming competency: The production specialist must be capable of performing all physical tasks that a farmer does in producing crops or animals. As mechanization advances, the agent must learn to operate and maintain various machines.

4. Communication competency: The agent must be able to describe new advances to rural people and to help them try new ideas. The agent must be able to plan, prepare, and present appropriate information for the relevant audience and to obtain feedback from them. The audiences include farmers, landlords, credit agency personnel, input distributors, wholesalers, retailers, or even consumers (Wortman and Cummings, 1981, p. 313).

Extension personnel require training both in subject matter and extension teaching methods. This is essential because the needs and problems of people undergo changes, as

does the technical know-how. To keep the extension staff in touch with the changing subject matter and the new methods of approaching problems is important from the view point of increasing their efficiency and effectiveness.

The element of training is almost completely missing in Pakistan. Once agricultural graduates enter the extension services, they seldom get help from experts outside their district staff. As such they lose interest and initiative when they feel they have nothing to offer to their clientele (Memon and Memon, 1982).

Governments should provide support to extension organizations wherever necessary, to allow them to upgrade competencies of extension workers and to establish close working relationships with research organizations (Wortman and Cummings, 1981).

Unfortunately, the basic support to extension organizations seems to be neglected by authorities in developing countries. This may be due in part to the support required for building huge and extensive capital structures. Such capital is unavailable in most of the developing countries (Wortman and Cummings, 1981).

Sabihi (1978) conducted a study to identify and describe the perceived professional education training needs of the extension specialists and agents in selected provinces of Iran which were related to areas of extension philosophy,

organization and administration, program planning, teaching-learning process, evaluation, and human development and social knowledge. He concluded that generally the extension specialists and extension agents expressed some need for professional education in performing the items involved in the above six training areas, and that program planning and extension philosophy, organization and administration were the areas perceived by the extension specialists and the extension agents respectively, as those in which they needed the greatest amount of training. Based on the study, he recommended, among other recommendations, that administrative authorities in the Extension Service in Iran should continue to develop an intensive in-service training program for extension specialists and agents so that they will receive increasingly more effective educational assistance concerning their professional needs in all the six training areas with special emphasis on the areas of program planning and extension philosophy, organization, and administration.

Studies conducted in the eastern states of Nigeria by Uwakah (1980) found that a majority of the junior extension workers considered their training inadequate to perform effectively as adult educators. Uwakah (1980) found there was a need for more formal/informal training in the areas of technical agriculture, program planning and design of

instruction, program evaluation and communication skills, and extension/adult education methodology and processes.

Ongondo's (1984) study identified and verified the professional competencies needed by intermediate agricultural extension personnel in Kenya. Respondents to Ongondo's questionnaire rated 97.8 percent of the identified professional competencies as being of "high importance" in the operation of a successful agricultural extension program. Ongondo interpreted the "high" ratings as an indication of extension personnel's concern for improving agents' expertise in extension methodology. He recommended the competencies identified be included in the curriculum of Kenya's extension pre-service and in-service training faculties. He further recommended that such training programs should emphasize the practical application of the competencies to be learned.

Bouchard (1966) studied the training needed by county agricultural extension agents in Quebec, Canada. He indicated that all Quebec extension agents ranked the greatest need for training to be in the areas of program planning, psychological and educational principles, and performance of educational activities. The areas ranked next were research and evaluation, knowledge about the extension service, social knowledge, and technical subject matter.

Mirza (1982) studied the perceptions of Iranian agricultural extension workers in relation to their adequacy in

providing instruction in the area of animal science. The major purpose of his study was to identify problems which may presently limit the productivity of the livestock industry in Iran. He found that on a scale of "great", "much", "some", and "none", Iranian extension workers mentioned that they needed much training in the following areas of poultry science:

1) Disease and disease prevention in poultry
2) Parasite control for poultry
3) Housing and equipment.

Schultz (1964, p. 160) emphasized that for the extension service to be efficient "it cannot restrict its activities to the promotion of one or even a few new agriculture factors". He further indicated that the extension organization must bring to its clientele who are mostly on-farm people, information relating to other aspects of farming and ideas that would help them (the clientele) improve their standard of living.

There was one study which dealt with extension personnel in Saudi Arabia. Al-Nassar (1981) studied the professional job knowledge and skills needed by extension personnel in the central region of Saudi Arabia. He investigated the needed and perceived training in the areas of program planning, extension service organization and administration, rural development, extension teaching methods and principles,

research and evaluation, and technical knowledge. Technical knowledge ranked second in need for training after research evaluation.

Al-Nassar (1981) found in the area of program planning that the training needs were: how to develop annual extension objectives, how to analyze the situation, how to develop long-range objectives, and how to organize and carry out a plan of action. In the area of extension service organization and administration, the training needs were: staff training and development, decision-making practice, administrative planning, organization, and policy.

Al-Zaidi (1982) studied adequacies of curriculum and training in agriculture provided at three Saudi institutions as assessed by administrators, instructors, senior students, and regional directors. He concluded that the respondents viewed the present curriculum, in general, as satisfactory. He found that the proficiency of graduates was assessed to be somewhat less than fully adequate by all groups; graduates were viewed as more able by instructors and administrators than by senior students and directors; the items rated as most important were summer experience in animal production, irrigation and drainage, field crops, animal nutrition, Saudi agricultural economics, and Islamic culture.

At a CENTO (1967, pp. 106-112) Conference, Homer V. Judge, then USAID Agricultural Extension and Education Advisor in Pakistan, stated that:

> ...extension services have a responsibility in the pre-service training of extension workers. At least they must become involved and determined and make known to training institutions what beginning extension workers need to know and be able to do to carry out effective programs of agricultural extension.
> ...it was necessary to provide agricultural extension workers with programs of instruction, training and practice in utilizing modern methods and processes of education. Not only should training programs for agriculture extension workers be concerned with technical agricultural knowledge but should also emphasize how to work with people. Training programs need to include methods and procedures for transforming technical knowledge of agriculture into action on the part of farmers for increased agricultural production.

Farmer Competency Studies

The review of literature revealed that several studies have been completed dealing with areas of production agriculture, farm credit, labor utilization and animal sciences. However, the researcher found no studies directly concerned with economic competencies needed and possessed by farmers.

Several competency studies concerning areas of agriculture have been completed and the results indicated that farmers will admit that they do not understand the principles or possess abilities needed in farm production and management. This study is similar in design to some of the completed studies.

Crop production activities performed by young farmers and vocational agriculture instructors in Missouri were studied by Yayock (1981). He found that there were significant differences between the response frequency ratios of the groups in three production activities in farm planning, six activities in seedbed preparation and planting, nine activities in crop maintenance, eleven activities in harvesting, storage and marketing, and eleven activities in agricultural mechanic. He also found that there were differences between the groups in the perception of the importance on 41 of the 79 crop production activity statements.

According to Bundy (1970, pp. 243-44) "the farm operator and farm worker of the future must possess greater competence in agricultural technology and management finesse than that possessed by former groups of farmers."

Whitaker (1976), in his study on the role of a crop manager in the horticultural industry found that the respondents evaluated the technical and management competencies to be mainly "essential" or "important but not essential." The proprietors marked "essential" most often for 52 of the 72 total competencies. The company respondents marked "essential" most often for 54 of the 72 total competencies. The proprietors and company respondents marked "important but not essential" most often 15 and 13 times respectively, for the 72 total competencies.

A study was made by Al-Shenaifi (1983) to ascertain the crop production activities performed by farmers and the crop production activities that can be performed by agricultural extension workers. He found that agricultural extension workers could not perform six of the activities to the extent that a farmer could. It was also found that a large number of farmers could not perform a large number of activities, especially in the area of agricultural mechanics. The three demographic variables, age, education, and years of work experience, were found to have significant differences among the mean ratings of the farmers. Therefore, it was concluded that the farmers could benefit from educational programs in selected areas of crop production, especially in the area of agricultural mechanics.

The purpose of the study by Bennett (1965) was to determine the competencies in soil management and use of fertilizers needed by farmers. The farmers evaluated each competency on a 10 point scale (0 to 9). The highest ranked competency for both the degree of competence needed and competence possessed was maintenance of soil productiveness for future generations. Bennett (1965, p. 76) concluded by stating that:

> The findings of this study indicate a need for training in all 46 competencies of soil management and fertilizer use. Training programs should be developed to provide for the needs of present and prospective farm operators. They should be included in vocational agriculture programs for high school students, in the young

farmer and adult programs, in cooperative extension programs, and in area vocational training programs and instructional programs in the College of Agriculture.

Christy (1966) developed a list of competencies in farm business analysis needed by farmers. Christy recommended that educational agencies must give instruction in record keeping and analysis high priority. Teachers and extension personnel must become adequately prepared in order to assume their responsibilities in providing instruction in the area of farm business. Educators must work closely with the computer services and establish a role as an educator. There will be a big need to interpret to the farmer what has been analyzed on the computer.

When the control factors were correlated with the degree of competence needed by the association members, two coefficients were found significant at the one percent level. They were age of operator and the ability needed to take time for bookkeeping and analyzing your business when the same competency was related to years of farming experience.

The study by Robinson (1964) involved competencies in farm machinery maintenance needed by farmers. Both groups of farmers sampled indicated they needed competency most in tractor overhaul, adjusting tractor hydraulic systems and adjusting and overhauling tractor carburetors. Robinson implied that curriculum changes in teacher education programs may be necessary to train instructors who are competent in

machinery repair and maintenance so more intensive training can be provided.

Beaver (1967), in developing a list of competencies in farm labor utilization needed by farmers, found that years of school completed by random sample farmers was significantly and positively correlated with degree of competence needed scores for: (1) ability to recognize conditions and circumstances requiring immediate attention and labor; (2) ability to arrange buildings, facilities and field layout to save labor and increase profits; and (3) the ability to use livestock production practices and equipment which save time and increase profits. He also found that random sample livestock producers indicated a higher degree of need for overall competence in labor management than did crops producers.

Anderson (1966) dealt with competencies in farm credit needed by farmers. There were significant correlations between years of farming experience and educational attainment (-), farm size and gross farm income (+), farm size and amount of credit used (+), and amount of credit used and gross farm income (+) for both association and random sample farmers.

The mean scores for competence needed by association members were 4.3 or higher (more than much competence needed) for the understandings of: (1) importance of a good credit rating, (2) net farm income, and (3) repayment capacity; and

for the abilities: (1) to keep complete and accurate farm records, (2) to analyze and interpret farm records and results, (3) to compute management returns, (4) to gain confidence of lenders, and (5) to distinguish between actual needs and mere desires. The association members indicated that they possessed the least competence in the understanding of: (1) crop insurance as a means of reducing risk, (2) sales contracts for soybeans, beef, etc., (3) credit life insurance, and (4) availability of government emergency loans. The study emphasized a greater need for educational programs in the use of farm credit.

Abel (1966) was concerned with competencies needed by farmers in forage production and utilization. Both respondent groups of farmers had higher over-all degree of competence needed scores than competence possessed scores. The five competencies with the largest competence needed mean scores for the group of outstanding farmers were: 1) determine levels of feeding forage, grain and supplement to formulate least time and least cost balanced rations; 2) determine the moisture content at which to begin final machine harvest operation for best storage preservation; 3) calibrate planting, fertilizing and spraying equipment; 4) recognize the stage of maturity at which to harvest high quality forage; and 5) evaluate quality of forage being fed.

Abel (1966, p. 61) summarized his findings as follows:

> The findings of this study indicate a need for training in all 34 competencies necessary for success with forages. The study shows some competencies need more emphasis than others. The respondents in both groups of farmers felt they possessed considerably less competence in forages than were needed. These 34 competencies should form the basis for forage production and utilization instruction in vocational agriculture classes for high school boys, young and adult farmers, in the cooperative agriculture extension program, in area vocational schools, and in the College of Agriculture resident instruction program.

A study to assess agricultural competencies possessed and needed by beginning agricultural workers in Afghanistan by Qaderi (1977), required six groups of agriculturists to respond to a list of 60 competencies in four major areas of agriculture namely, animal science, plant science, agricultural mechanics, and extension education. He found that all the six groups of the respondents indicated that the beginning agricultural workers possessed significantly lower levels of competencies, by total and by each of the four subject areas, than were needed. In addition, the study also found that administrators rated the possession of competencies significantly lower than did either undergraduate or graduates, and that farmers rated the need for competencies significantly higher than did faculty members, supervisors, graduates and undergraduates.

Carter (1976) identified the professional competencies needed and possessed by beginning teacher educators in agricultural education. He found that beginning teacher

educators needed an average degree of ability in all 144 competencies that he studied, a high degree of competencies in performing 87 of these competencies and a very high competence in performing 14 of these competencies. Whereas, he found that teacher educators possessed an average degree of competence in 112 of these 114 competence and a high degree for only nine competencies.

The study by Lamberth (1982) identified and verified the professional education competencies needed and presently held by beginning teachers of vocational agriculture in Tennessee. Ninety-six of the 99 competencies needed by beginning teachers received mean ratings of 3.00 or higher, and 93 of the 99 competencies presently held by the beginning teachers received mean ratings of less than 3.00. He recommended that high rated competencies be incorporated into the agricultural education curriculum at Tennessee Technological University, and be used to design in-service teacher training programs.

Kruskop (1966) found that the following were the competencies most needed by farmers in the farm management area: an understanding of farm record keeping and farm business analysis, the ability to analyze and interpret records, and the ability to keep accurate and relevant records.

Ahalt and Smith (1954) made a study of technical skills in livestock management needed by teachers of agriculture. The study dealt with skills needed in the major livestock

enterprises of the North Atlantic region of the United States. They found that skills in feeding, selection, judging, care and management, breed identification, and construction of equipment were important in all enterprises.

Anochili (1981) studied animal science activities of young Missouri farmers. He found that there were significant differences between the response frequency ratios of young farmers and vocational agriculture instructors on 18 of the 75 animal science activity statements. He also indicated that there were differences in the perceptions of the importance on 22 of the 75 animal science activity statements.

Based on the findings of the study of competencies needed by poultry producers in the eastern province of Saudi Arabia done by Al-Zahrani (1983, pp. 97-98), the following conclusions are presented.

1. Poultry producers and professionals rate the competencies pertaining to broiler production and egg production high in importance. Generally the producers rate the competencies slightly higher in importance than the professionals.
2. Poultry producers rate their present level of knowledge for the competencies to be low.
3. Poultry producers indicate that they need additional training.

4. There are strong, positive relationships between poultry producers' perceptions of training needed and training needs computed using the Borich Model.
5. There are no relationships between the demographic characteristics of poultry producers and their ratings of importance of the competencies.

The study recommended that sound, effective, and efficient training programs should be planned and implemented to help poultry producers improve their competencies.

The professional competencies study completed by Ayewoh (1983, pp. 105-108) concluded that:

1) There were no statistically significant differences in the extension agents (LGA staff) and State staff perceptions of the need for competencies in program planning, program execution, program evaluation, teaching, communication, understanding human behavior, and young farmers' club. The only competency category where a statistically significant difference occurred was in Administration and Supervision.

2. Both the State and the LGA staff perceived 98 percent (60 out of 61) of the identified professional competency statements to be of high need to very high need.

3. The extension agents indicated 59 of the 61 professional competency statements or items should be learned on the job. On-the-job training included orientation, induction, symposia, workshops, conferences, training and visitation (T&V), clinics, demonstration, learning by actual doing on the field and field trips or excursions.

The purpose of the study by Easter (1985) was to identify and assess the professional competencies needed by the Swaziland Ministry of Agriculture and Cooperatives extension

workers (agents). Formal training of respondents was consistently related to higher ratings of the competencies, as would be expected. There continues to be a need for formal training of extension personnel and to upgrade and improve the formal training and the educational level of the extension staff. This was further substantiated in the responses between areas of responsibility.

Harzman (1977) found in his study in Latin America, that the members of the jury of experts placed higher values on applied competencies than on theoretical competencies. He also found that the five most important competency categories were soil conservation, applying fertilizer, producing poultry, insect and pest control of field crops, and feeding livestock.

Christensen (1968) determined the competencies in animal nutrition needed by farmers. The farmer respondents had degree of competence needed mean scores of 3.0 (much competence needed), or higher, on a five point scale (0 to 4) for the understanding of (1) how ration imbalance can affect nutrient utilization, and (2) purpose and use of antibiotics.

Abilities with high competence needed mean scores for both groups were the abilities to (1) calculate gains, feed efficiency and cost of production, (2) recognize poor performance and nutrient deficiencies, (3) determine when

animals need a different ration, and (4) interpret information on a feed tag.

Christensen (1968) indicated that with the rapid developments in technology related to animal nutrition, it is imperative that increased effort be extended to provide in-service instruction to present farmers.

Lockwood (1964) studied the competencies needed by males engaged in dairy farming. Mean scores of 3.0 or higher for competence needed (much competence needed) were indicated by both DHIA and owner sampler dairymen for understandings of 1) physical appearance of profitable dairy animals; 2) methods of maintaining the high sanitation standards and the use of chemicals in this operation; 3) internal organs and their functions in dairy animals; 4) dairy product standards set by law and by the local milk market; and 5) sources of financial help in establishing and maintaining a dairy herd.

Competence needed scores of 3.3 or higher (more than much competence needed) were indicated by both DHIA and owner sampler dairymen for the abilities 1) to make efficient use of high quality roughages; 2) to keep production records on all animals and cull the less profitable cows; 3) to use milking equipment correctly and keep it in good operating condition; 4) to feed cows a balanced ration based on maintenance and production needs; 5) to plan an adequate ration and feed dry cows; 6) to determine the amount and kind of

concentrate to feed, considering dairy product prices and input costs; 7) to select desirable production and breeding stock and follow a constructive breeding program; 8) to recognize and treat or prevent diseases and parasites in cooperation with a veterinarian; and 9) to follow production practices conducive to the profitable production of high quality milk.

To summarize, Lockwood (1964, p. 94) stated:

> There were at least 46 competencies necessary for success in dairying. The members of the DHIA and owner-sampler record associations in the sample felt they possessed significantly less competency than they needed in the 46 competencies included 0.5 difference for DHIA and 0.6 difference for owner sampler dairymen between total over-all mean scores for competency needed and possessed).

In 1965, Hoyt studied competencies in livestock marketing needed by farmers. Hoyt (1965, p. 111) concluded in his summary:

> There were at least 23 competencies necessary for success in beef marketing, 25 in sheep marketing, and 19 in swine marketing. These 67 competencies have importance in planning training programs for present and prospective beef, sheep, and swine producers.

Harper (1968) studied competencies in Swine production. Over-all mean scores for degree of competence needed were exactly the same for both groups (2.9), but the over-all mean score for degree of competence possessed by master swine producers was 2.6 as compared to 2.3 for the random sample swine producers.

Mean scores of 3.0 or higher for degree of competence needed were indicated by both groups for the understandings of: 1) the factors that contribute to the high quality pork demanded by the consumer; 2) the possibilities for genetic improvement of desirable traits; 3) the effect of performance traits on production costs; 4) the effect of the ration, condition, exercise, and other factors on litter size; 5) the function of, and requirements for feed nutrients; 6) the importance of fresh clean water; and 7) the effect of stress and how it can be minimized.

Abilities needed, with scores of 3.0 or higher, by both master swine producers and random sample respondents were: 1) to make timely decisions in swine management; 2) to provide adequate swine housing and ventilation; 3) to evaluate carcass and other production testing information in the selection of breeding stock; 4) to appraise the sow herd and select boars to improve observed weaknesses; 5) to formulate rations for various stages of swine production; 6) to feed at correct levels and at the right time, chemicals, antibiotics, and drugs; 7) to develop and use an effective sanitation and health program; 8) to recognize and treat or prevent diseases, infections, internal parasites, and external parasites; 9) to determine when a veterinarian is needed, or when home treatment is sufficient; 10) to recognize milking problems in sows and to take corrective measures; and 11) to

keep, analyze, and use accurate records in the management of the swine enterprise.

Harper (1968, p. 104) concluded in his summary as follows:

> This study indicates a greater need for educational programs in swine production. These competencies should be emphasized in providing in-service training for present swine producers, as well as training for prospective swine producers. This training would greatly improve the efficiency in swine production and the quality of pork produced.

In his study of competencies in dairy production needed by dairy farmers in Sudan, Omer (1983) found that the dairy farmers possessed few competencies and needed more competencies in dairy production. The study emphasize the need for education related to dairy production among the older and more experienced farmers. The study suggested that 42 of the 46 competencies should form the basis for instruction in young and adult farmers classes in dairy extension programs, and in agricultural training centers as well as in other agricultural institution programs.

Summary of Literature Review

The review of literature was organized to include studies about the farmers' education, training needs for extension personnel, and competencies needed by farmers.

As there is a dearth of research in education within Pakistan, most studies reviewed were conducted in the United States of America or other developing countries. Such a

focus does provide a broader reference base for the study than would otherwise be possible. However, it is stressed that adoption of such findings to the situation in Pakistan needs to be restricted to those practices which are applicable.

The identification of agricultural competencies to be taught in agricultural programs has been a concern of individuals responsible for planning programs in several states in the U.S.A. and in some countries of the Third World. However, no studies were found in Pakistan that ascertained the competencies needed and possessed by farmers in the area of economic competencies.

Competency-based education appears to be gaining wide acceptance as a viable delivery system for providing professional preparation. At present, research findings support the concept of utilizing educational strategies that include opportunities for students and adult learners to develop competencies and skills, rather than those which concentrate solely on the acquisition of academic knowledge. For this reason, it seemed to be worthwhile to compile the research on certain specific and basic assessments of the implication of the curriculum to the needs of graduates.

Most of the studies cited support the premise that certain competencies are needed for success and that educational programs can be effective in teaching these practices. They

also indicated that there are many factors that affect the production and management practices used by farmers.

The studies reviewed by the investigator lead to these conclusions:

1. Specific competencies required for success in agricultural production and management need to be identified.
2. Educational programs should be updated or developed to provide proper training of those presently engaged in agricultural production and management.
3. Agricultural competencies can be effectively taught through both formal and nonformal educational programs.

CHAPTER III. RESEARCH PROCEDURES

This chapter describes the research procedures followed to accomplish the purpose and objectives of the study.

Population and Sample

The target population for this study consisted of farmers and agriculture officers in Hyderabad District, Sind, Pakistan. The first group consisted of 100 randomly selected farmers, twenty five from each of the four talukas in the district. A table of random numbers was used in the random selection process. Three people refused to participate, thus data were collected from 97 farmers.

The second group consisted of the 26 agriculture officers in the district. All of these officers participated in the study.

Instrumentation

Thirty seven competency statements constituted the competency portion of the questionnaire. Some of these competencies were drawn from literature; others were suggested by this dissertation advisory committee. The researcher added a number of competencies drawn from his experiences and knowledge of Pakistan conditions.

A 1-5 point response scale was used to assess the degree of competence needed and the degree of competence possessed by the farmers for each of 37 competencies included in the

questionnaire. A "1" indicated do not know, "2" indicated little competency needed or possessed, "3" indicated moderate competency needed or possessed, "4" indicated high competency needed or possessed, and "5" indicated very high competency needed or possessed. A copy of the questionnaire used in the study is presented in the Appendix.

One section of the questionnaire gathered data relating to the demographic characteristics of each group. These variables included land ownership, education, years of work experience, employment of hired workers, livestock owned, and the number of dependent family members. The last section of the questionnaire gathered data regarding sources of information used by farmers.

Field testing involved the administering of the questionnaires to farmers and officers not included in the research samples. Field testing enabled the researcher to improve upon the overall organization of the instrument, clarity, suitability of the questions, and general reactions to the instrument. Modifications were made based upon the field test.

To ascertain the content validity of the instrument used in this study, a panel of experts involved in research, extension and education in Pakistan was used to validate the content that the instrument was to measure. Suggestions of

the panel were incorporated into the final copy of the instrument.

Data Gathering Techniques

The researcher collected the data through personal interview with farmers and agriculture officers included in the sample. The farmers were interviewed on their farm or in a quiet place, as a restaurant. Some of the farmers were interviewed by the investigator at the home of a key-man of the village. This person would encourage the farmers to participate in the study. All agriculture officers were interviewed by the researcher in their offices.

Before the interviews, the investigator explained the purpose of research and assured the respondents that all information was confidential. Approximately forty-five minutes were required to conduct each interview. Two to three interviews were conducted in a day depending on the availability of respondents and travel distance.

Analysis of Data

In analyzing the data, descriptive statistical procedures were used. The statistical package program for the social sciences (SPSSx) (Nie, 1983) was used for this study. The following subprograms and procedures were utilized:

1. The subprogram FREQUENCIES was used to analyze means, standard deviations, frequencies, and percentages.

2. The subprogram RELIABILITY was used for testing reliability of the questionnaire.
3. The paired T-TESTS was used to calculate t-values for the difference in competencies needed and possessed. The 0.05 level of significance was used as a basis for determining significant differences between means.
4. The subgroup T-TEST was used to calculate t-values for the difference in responses in two groups of respondents (farmers and agricultural officers). The 0.05 level of significance was used as a basis for determining significant differences between means.
5. The subprogram ONE-WAY was used to test for significant differences among farmers when grouped by educational level, years of farming experience, and tenancy status. The Scheffé test was used to locate the sources of differences when significance (0.05) was observed in the analysis of variance tests.

CHAPTER IV. FINDINGS

The primary purpose of this study was to identify the economic competencies needed and possessed by the farmers in Hyderabad District, Sind, Pakistan. This findings chapter is organized under the following headings: (1) Reliability of Instrument, (2) Characteristics of Farmer Respondents, (3) Characteristics of Agriculture Officers, (4) Benefit of Farmer Educational Programs, and (5) Economic Competencies Needed and Possessed by Farmers.

Reliability of Instrument

The instrument used to gather data pertaining to economic competencies was tested for reliability with the two groups of respondents: farmers and agriculture officers. The reliability coefficients ranged from .94 to .97 as reported in Table 1. The alpha coefficient for the instrument on competencies needed as perceived by farmers was .97, and .95 for the agriculture officers. The alpha coefficient for the instrument on competency possessed as perceived by farmers was .95, and .94 for agriculture officers.

Characteristics of Farmer Respondents

Through a series of questions in part one of the questionnaire, data related to personal characteristics and the in-service training program was gathered to provide an understanding of the background of respondents.

The number and percent of responses relative to the marital status of the farmers are presented in Figure 1. Of the 97 farmers studied, 81 or 83.5 percent were married and 16 or 16.5 percent were single. All farmers in survey were male.

Table 1. Reliability coefficients for economic competencies needed and possessed by farmers

Scale	No. of cases	No. of scale items	Cronbach's alpha level
Farmers			
Competencies needed	97	37	.97
Competencies possessed	97	37	.96
Agriculture Officers			
Competencies needed	26	37	.95
Competencies possessed	26	37	.94

Figure 2 shows the number and percent of farmers by tenancy status. The data indicate that 37.1 percent of the farmers were owner-operator, whereas, 13.4 percent were owner-tenants. It is also shown that 13.4 percent were tenants (do not own but cultivates land for others on share basis), and 36.1 percent were owner-landlords (those who own land and hire tenants to farm it on a share basis.

Slightly over one-fourth (26.8 percent) of the farmers were illiterate as revealed in Figure 3. One-third had received a primary education. About one-fifth (20.6 percent) had attended secondary school, and 5.2 percent had completed

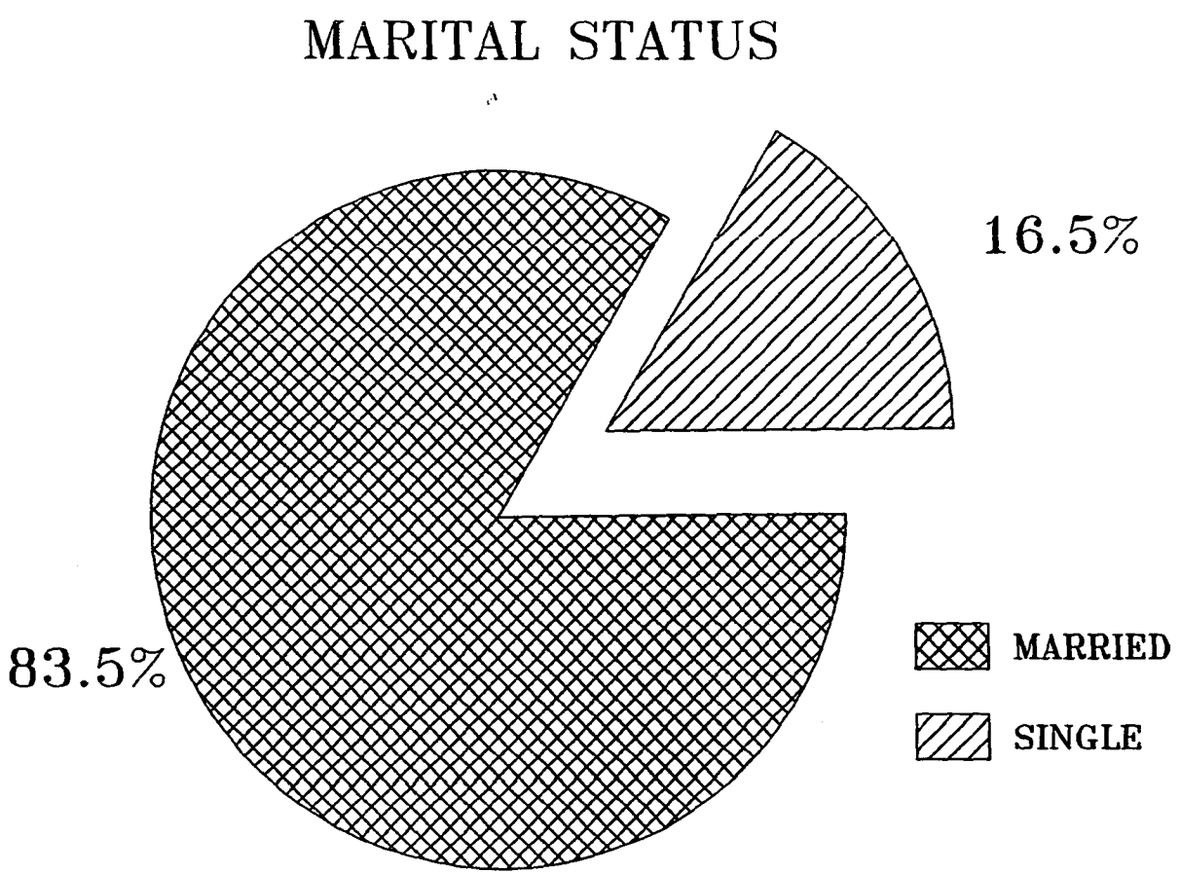

Figure 1. Marital status of the farmers

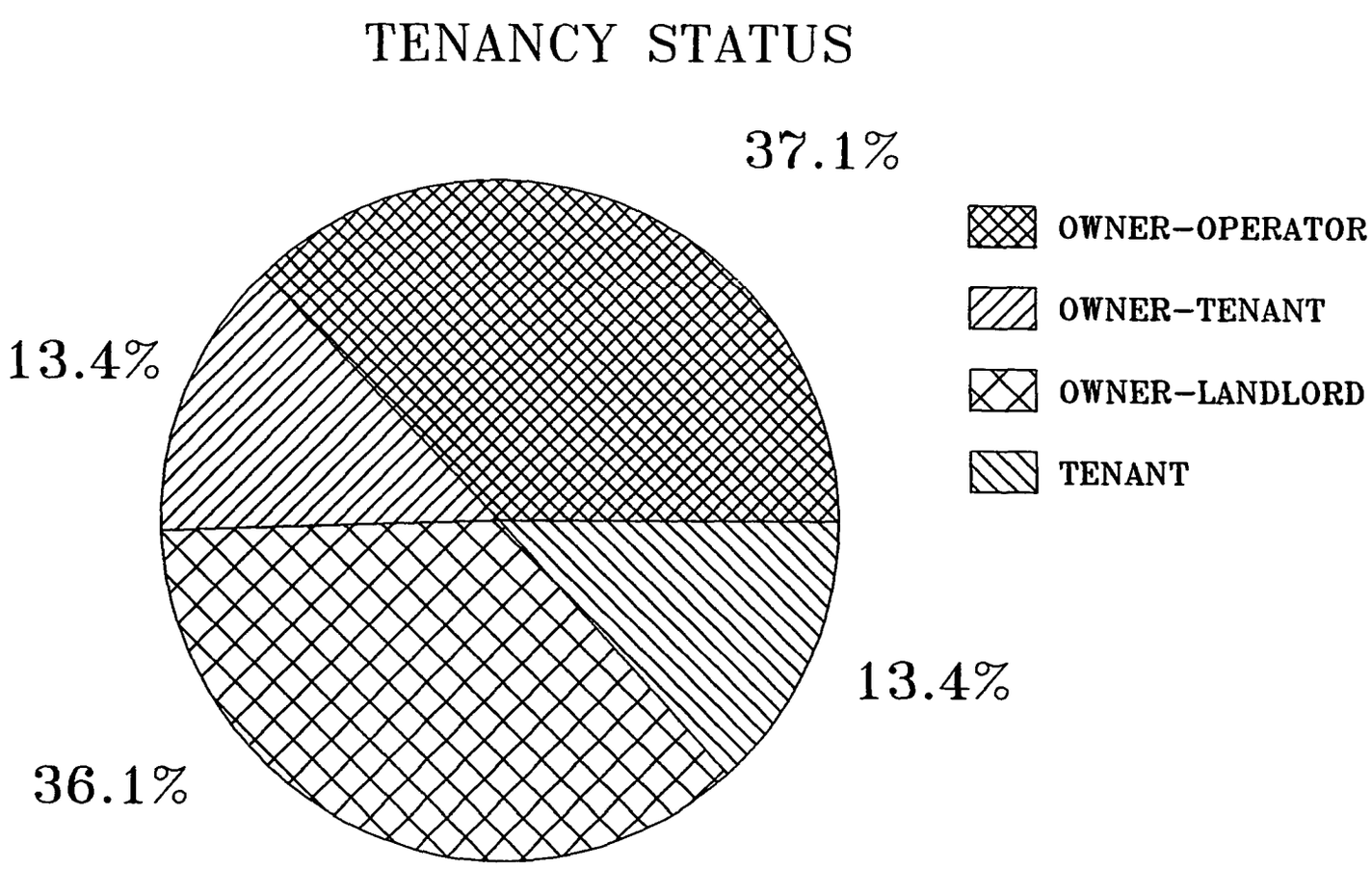

Figure 2. Tenancy status of the farmers

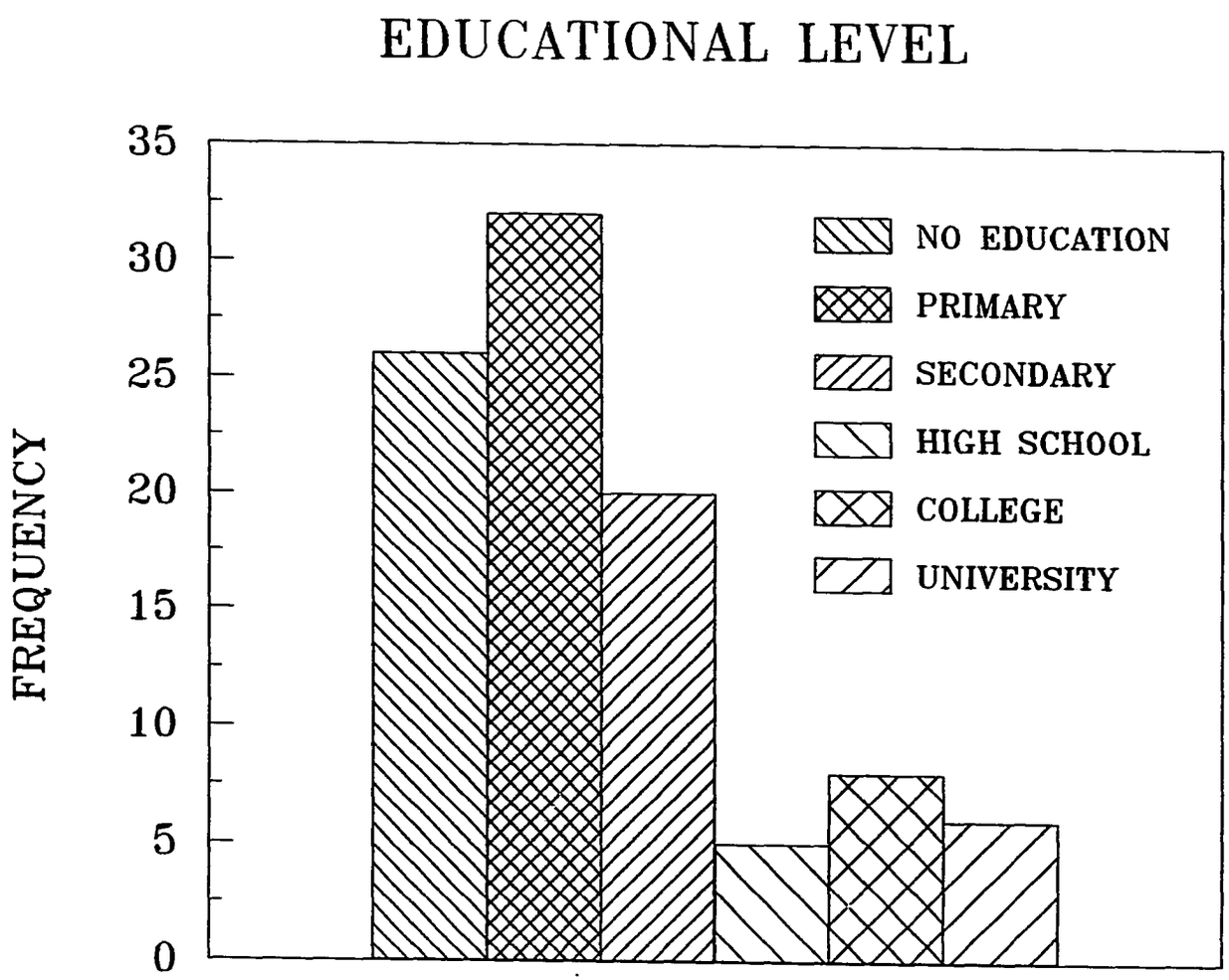

Figure 3. Educational level of the farmers

high school. Only 12.4 percent of the farmers had attended a college or university. Many of these would be in the owner-landlord tenancy status discussed earlier.

The distribution of farmers by years of experience in farming is presented in Figure 4. The mean years of farming experience was 18.22. Approximately 69 percent had farmed from 1 to 20 years, whereas 31 percent had farmed 21 or more years.

Over one-half of the farmers had 1 to 3 male and 1 to 3 female dependents as revealed in Table 2. A few families had 7 or more of each. The mean size of the farm family was 4.8 (3.8 dependents per farmer).

Table 2. Family members of the farmers

Members	Male		Female	
	Frequency	Percent	Frequency	Percent
1-3	58	59.8	51	52.6
4-6	27	27.8	37	38.1
7-10	9	9.3	7	7.2
Over 10	3	3.1	2	2.1
Total	97	100.0	97	100.0

The data in Table 3 reveal that about one-third (34.0 percent) of the farmers owned 25 acres or less of the land they farmed. Twenty percent owned 76 acres or more of the

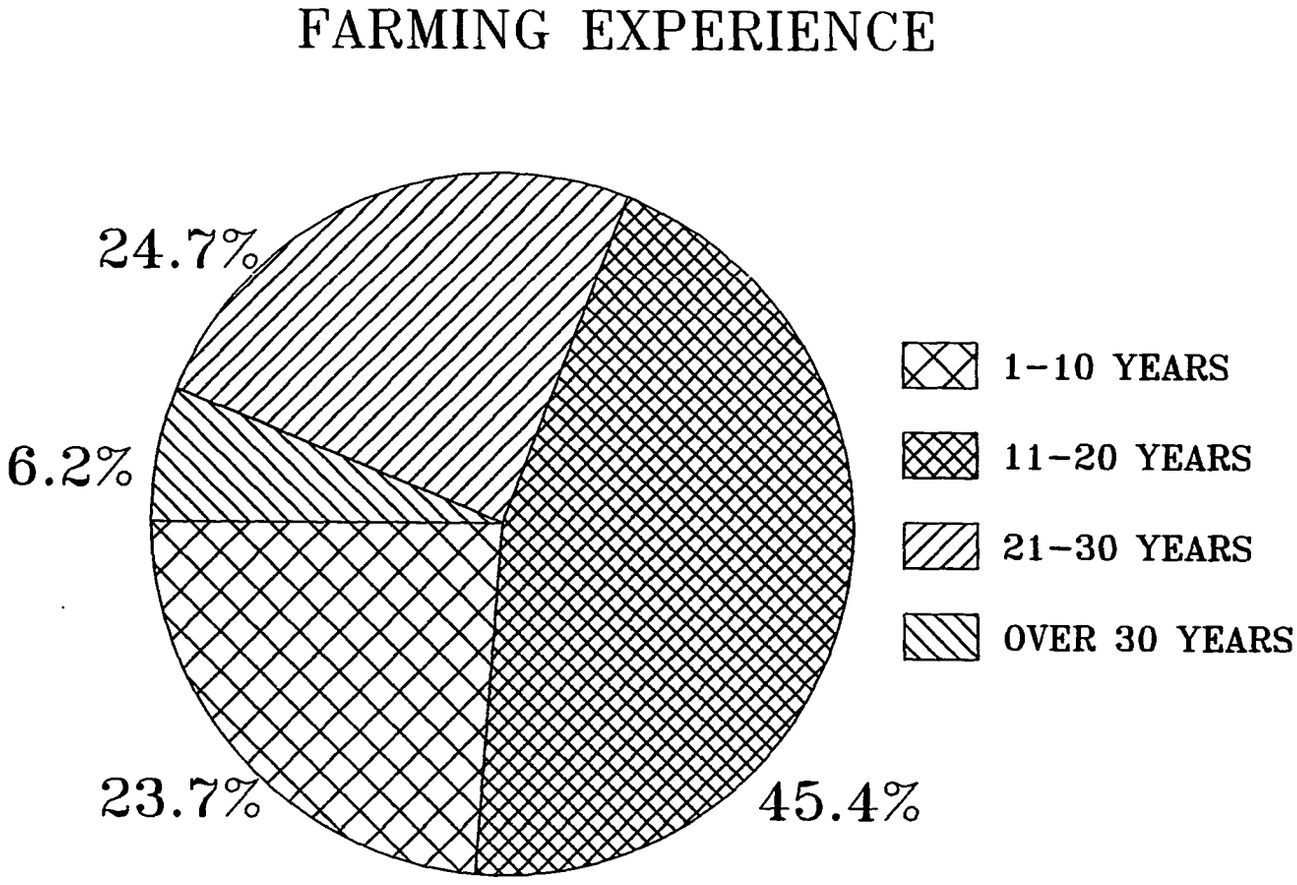

Figure 4. Years of farming experience

land farmed. The mean acres owned by the farmers was 51. Almost 30 percent of the farmers owned 26 to 50 acres of land. Only 12.4 percent of the farmers owned over 100 acres.

Table 3. Ownership of land farmed

Number of acres	Frequency	Percent
0-25	33	34.0
26-50	29	29.9
51-75	16	16.5
76-100	7	7.2
Over 100	12	12.4
Total	97	100.0

According to data in Table 4, most of the farmers (90.7 percent) rented 0 to 25 acres of land. The remaining farmers rented 26 and over acres of land. Mean acres rented was 21.

Table 4. Acres of rented land

Number of acres	Frequency	Percent
0-25	88	90.7
26-50	5	5.2
51-75	1	1.0
76-100	3	3.1
Total	97	100.0

As shown in Figure 5, 32 percent of the farmers did not employ workers on their farms. Approximately sixty percent of the farmers had 1 to 3 full-time hired workers and 8.3 percent had 4 or more workers. The mean number of hired workers per farmer was 2.0.

As shown in Figure 6, most farmers (81 percent) owned 10 or less animals, while approximately 19 percent owned more than 10. The mean number of animals owned by farmers was approximately 7.

Characteristics of Agriculture Officers

The educational level of the agriculture officers is reported in Figure 7. Most (80.8 percent) of the officers had a Master's Degree in Agriculture and 11.5 percent had a Bachelor of Science degree in Agriculture. The remainder (2 officers) had only the diploma of agriculture. Because of long service to extension and a satisfactory service record, these diploma holders had been promoted to the posts of agriculture officers from initial appointment as field assistants.

Figure 8 shows that only 15.4 percent of the agriculture officers had received in-service training for their work as extension agents. Due to lack of emphasis on in-service training by extension in the country, these personnel seldom get a chance to attend training sessions.

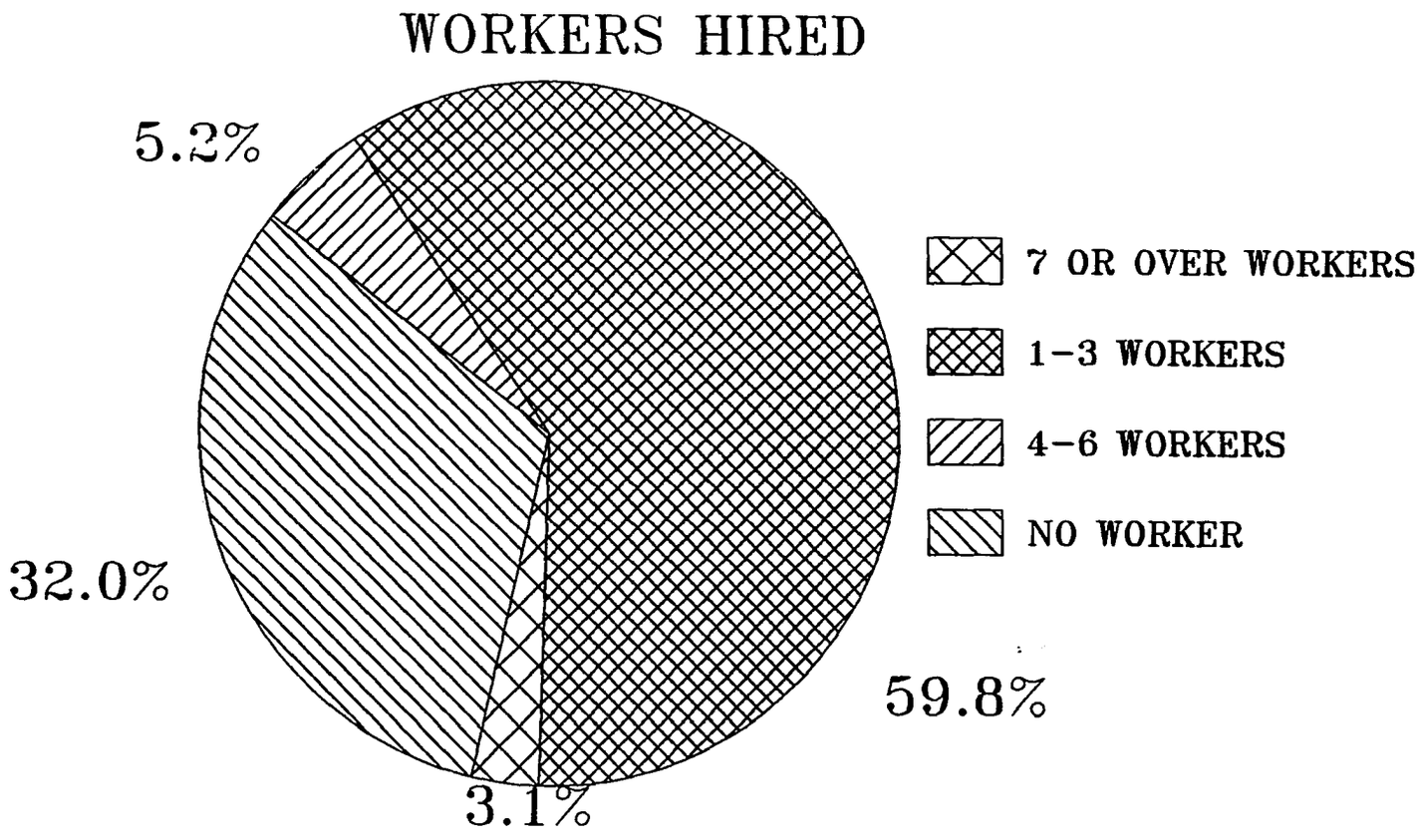

Figure 5. Workers hired by farmers

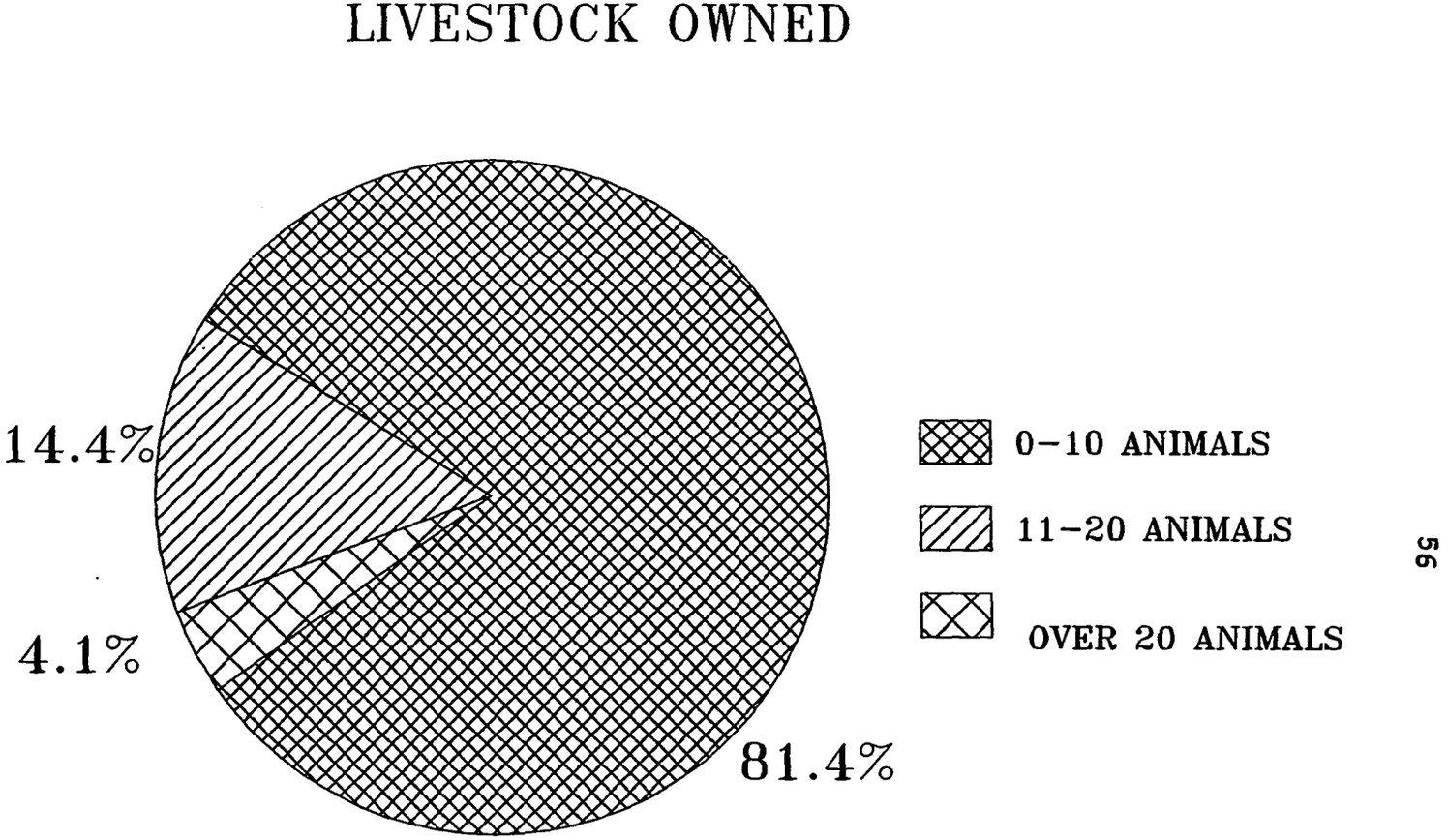

Figure 6. Livestock owned by farmers

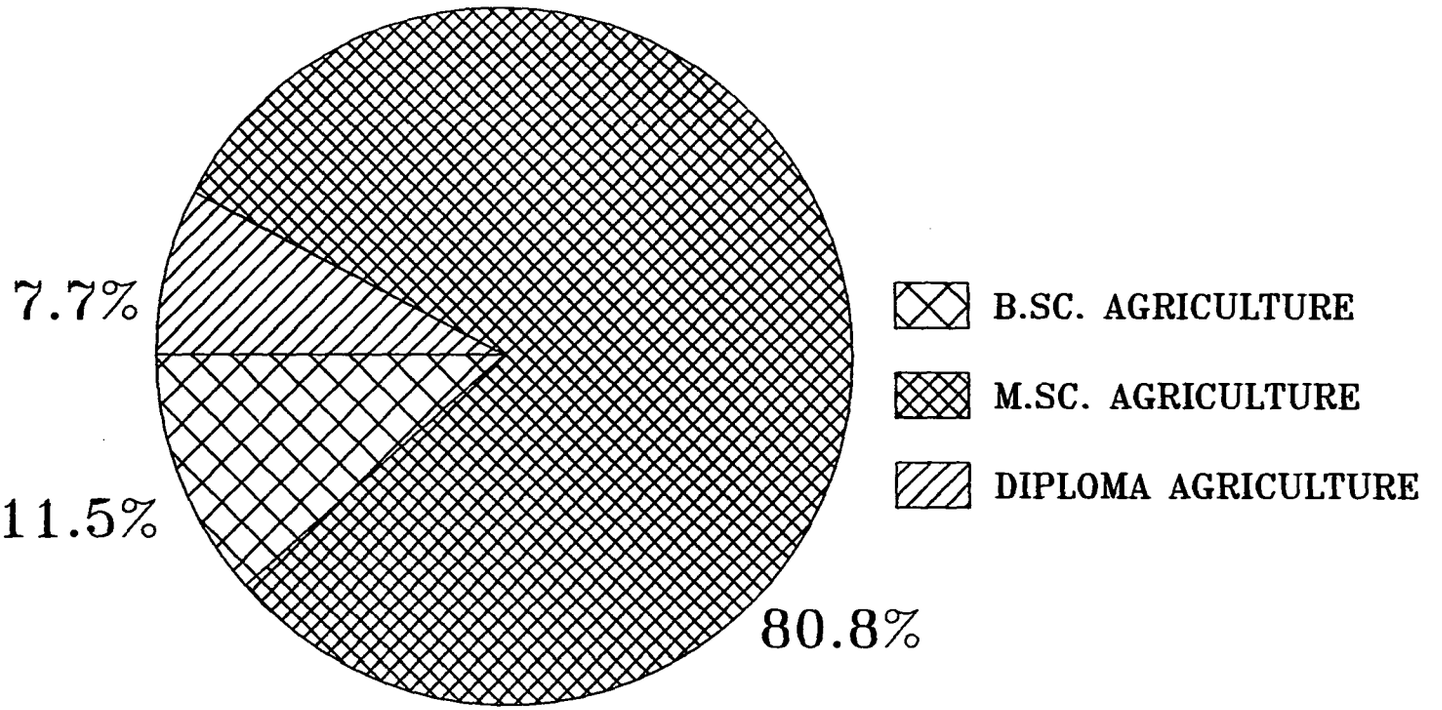

Figure 7. Educational level of the agriculture officers

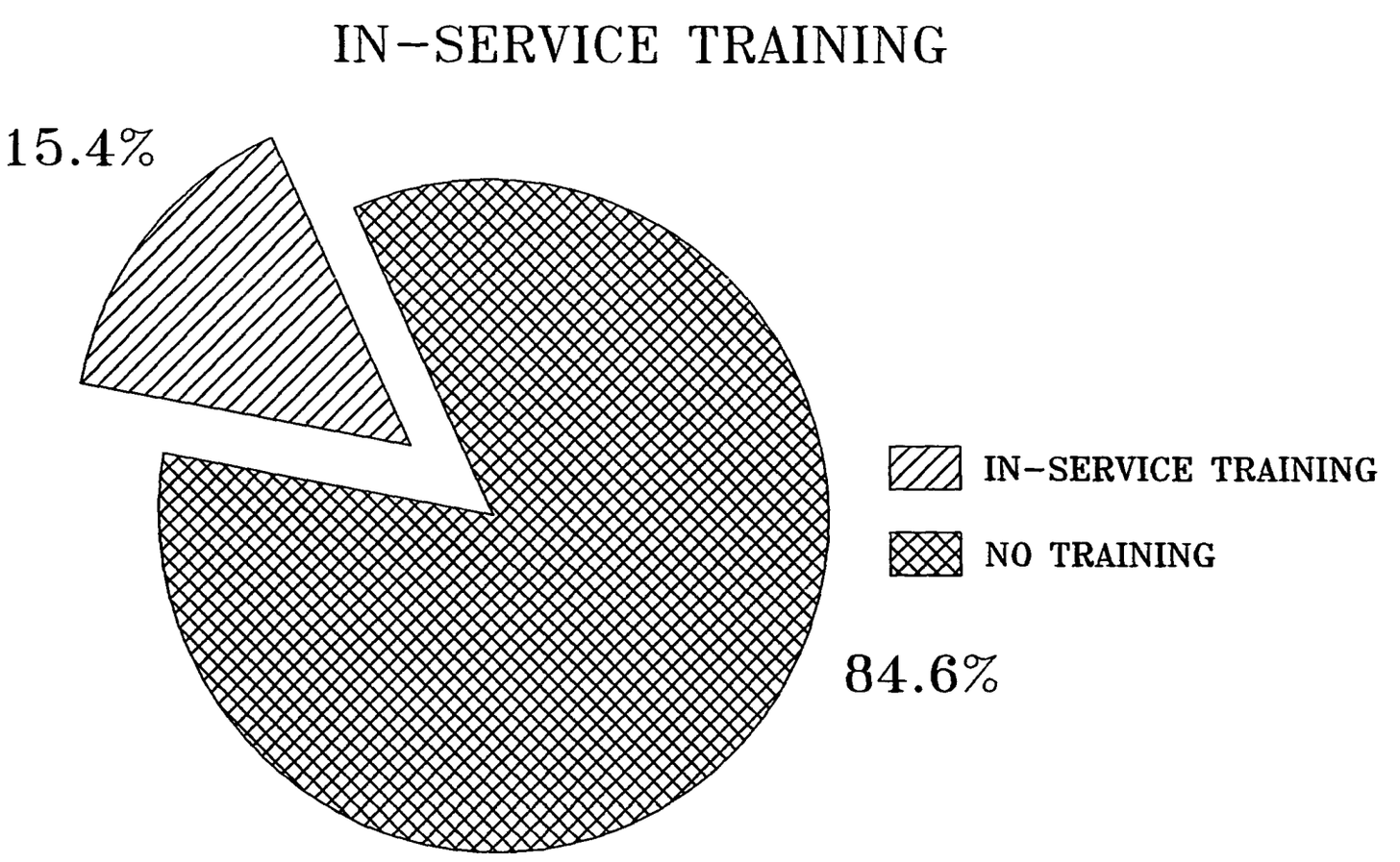

Figure 8. In-service training of agriculture officers

Figure 9 displays the years of experience in extension by the agriculture officers. Most of the officers had 3 to 17 years of experience in extension. Only 23 percent of agriculture officers had 17 years or more extension experience. Agriculture officers may move from one district to another, but promotions in the extension service are very limited, encouraging long tenure of extension officers.

Benefit of Farmer Educational Programs

The data were gathered to assess the benefit of farmer educational programs and the importance of source of information in the dissemination of technological innovations to farmers.

As shown in Figure 10, farmers and agriculture officers most frequently named short courses as the most beneficial educational extension program followed by agricultural demonstrations, farmer conferences and day classes. The largest number of respondents named agriculture demonstrations as the second most beneficial program. Farmer conferences were most frequently named as the third most beneficial farmer education program.

From this information, it can be concluded that the respondents of this study consider the short courses, agriculture demonstrations and farmer conferences as the most valuable educational programs. These programs are commonly conducted by an agriculture university and an extension

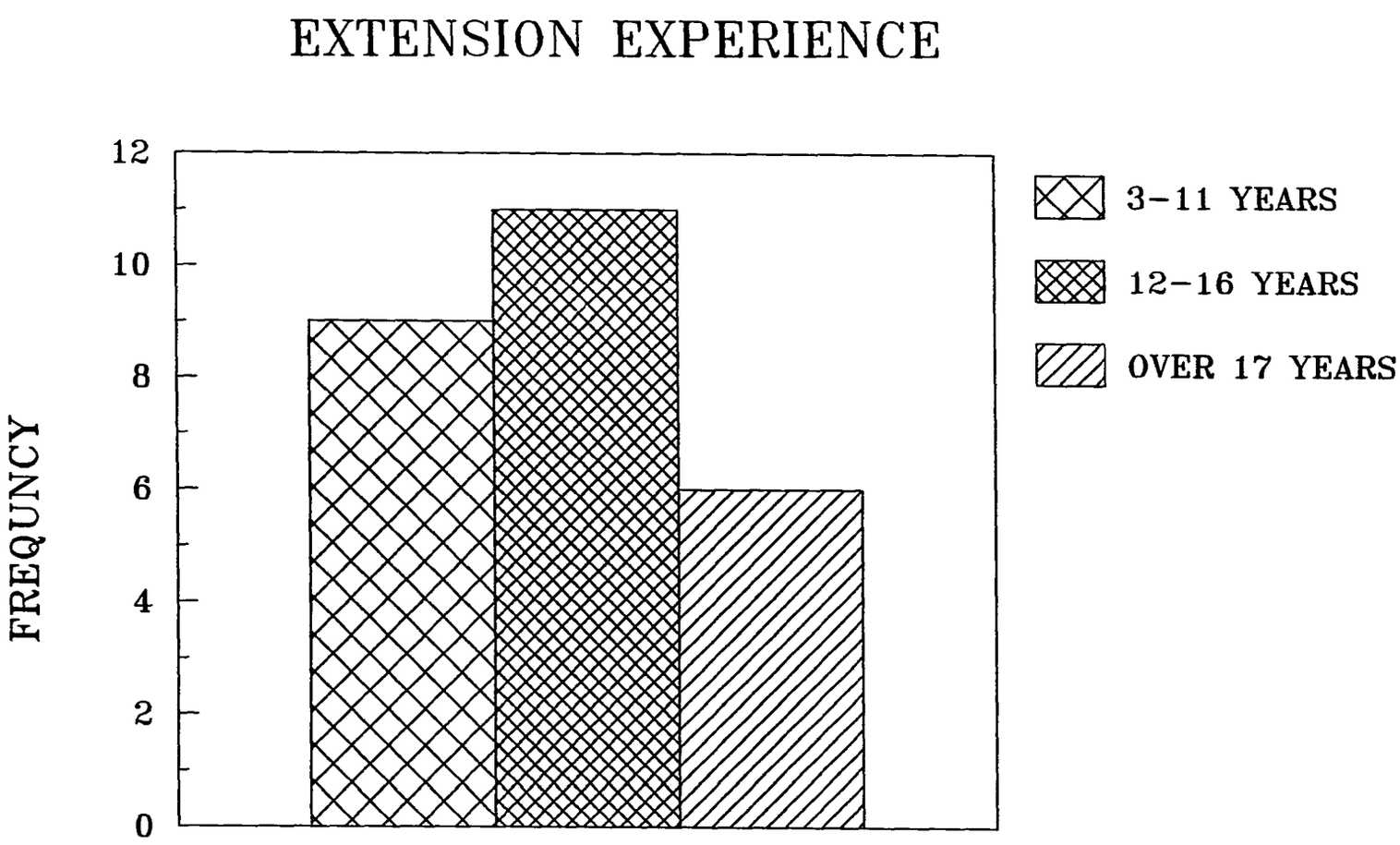

Figure 9. Extension experience of agriculture officers

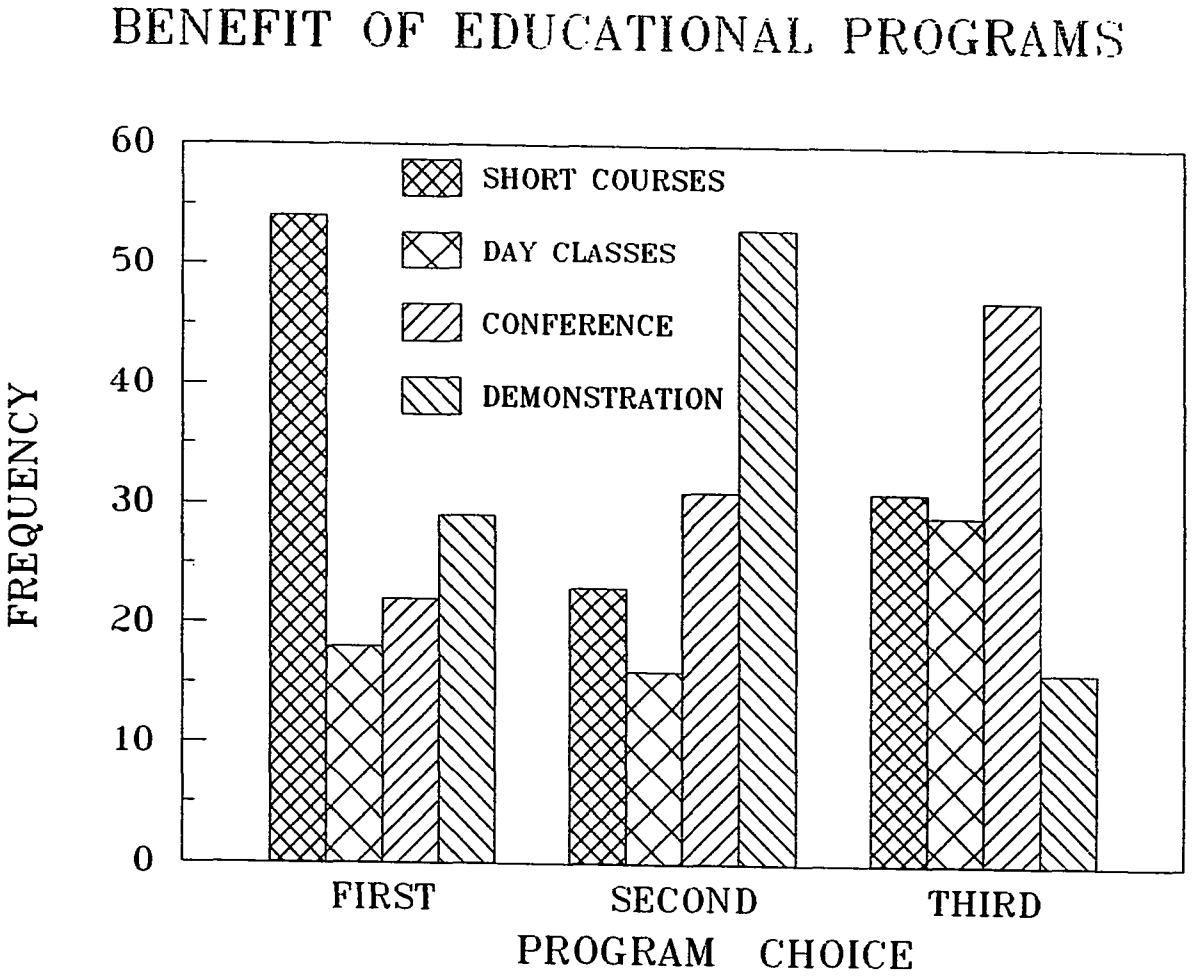

Figure 10. Benefit of educational programs to farmers

institution to educate the farmers concerning new farming practices.

The farmer respondents were asked to rank the suitability of sources of farming information. Extension workers were most frequently named as the most suitable source of information. As a second choice, radio had the highest frequencies. Television was the most frequent third choice of information identified by farmers. Therefore, it can be concluded that farmers preferred extension workers, radio and television as sources for farming information (Figure 11).

Table 5 presents the perceptions of agriculture officers, regarding the most suitable source of delivering information to farmers. The most frequently named first choice was the radio. The second most frequent choice was television, followed by newspaper as the most frequent third choice. It can be perceived that Agriculture officers named the radio, television and newspapers as the most suitable method of transferring new knowledge to farmers.

Table 5. Opinion by agriculture officers regarding sources of information most suitable for farmers

Source	First choice	Second choice	Third choice
Radio	21	4	2
Television	1	15	8
Newspaper	2	5	12
Magazines	0	2	0
Newsletter	2	0	4

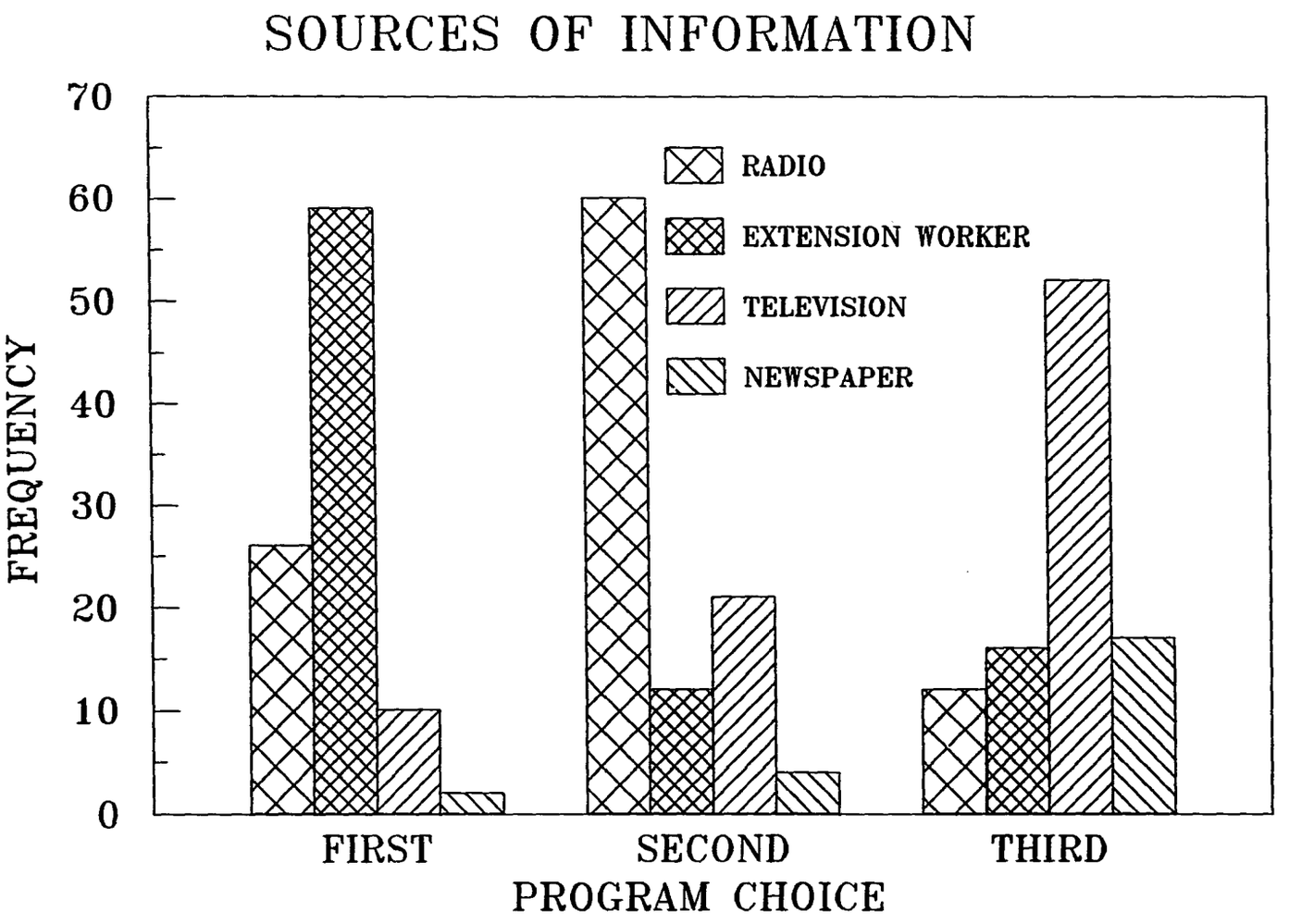

Figure 11. Suitability of sources of farming information

Economic Competencies Needed and Possessed by Farmers

The degree of economic competencies needed and possessed by farmers as perceived by farmers and agriculture officers were analyzed in this study. A five-point scale was used to investigate the degree to which farmers needed and possessed thirty-seven economic competencies.

Perceptions of Farmers

Table 6 shows the means and standard deviations for the economic competencies needed and possessed by farmers as perceived by farmers. The overall mean for economic competencies needed was 4.02 with .60 standard deviation. All of the competencies had a "needed mean" of 3.75 or above on a five-point scale. Twenty competencies had means of 4.00 and above.

The highest mean score (4.33) for degree of competence needed by the farmers was for "keep and analyze production record for the crops". The second highest mean (4.27) was for "budget the annual cost and return in crop production".

Other competencies with a mean of 4.00 or above (much competence needed) as perceived by the farmers were: (1) select profitable crops (4.25); (2) understanding the importance of crop rotation (4.22); (3) have mathematical abilities (can add, subtract, multiply and divide) (4.22); (4) calculate the quantity of seed needed to plant a fixed number of acres (4.19); (5) determine the benefit of owning or rent-

ing farm machinery (4.19); (6) schedule plantings at proper time (4.18); (7) select sites suitable for crops (4.16); (8) understand how to use credit (4.15); (9) evaluate economic impact of careless crop handling (4.14); (10) understand the best time to market different crops (4.13); (11) adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns (4.12); (12) determine appropriate method of harvesting to minimize cost; (4.11); (13) provide financing through credit agencies (4.11); (14) determine fertilization rates required for maximum yield (4.07); (15) improve knowledge of crop production through various sources (4.03); (16) analyze different ways to buy fertilizer (4.01); (17) use proper storage for crops (4.01); and (18) analyze future production (4.00).

It was concluded that all competencies were needed since the ratings were above 3.00, a rating of "moderate" or above in importance.

Table 6 also presents the means and standard deviations of the competencies possessed by the farmers as perceived by themselves. The overall mean score calculated for degree of competence possessed was 2.42 with a .76 standard deviation. None of the competencies were rated 3.00 or above out of a possible rating of 5.00. Sixteen competencies had means between 2.50 and 2.94.

Table 6. Farmers' perceptions of the economic competencies they need and possess

Competency	Needed	Possessed
	Mean S.D.	Mean S.D.
Select profitable crops	4.25 .72	2.94 1.03
Select sites suitable for crops	4.16 .67	2.71 1.11
Schedule plantings at proper time	4.18 .72	2.85 1.05
Calculate the quantity of seed needed to plant a fixed number of acres	4.19 .70	2.90 .92
Understand the importance of crop rotation	4.22 .71	2.59 .92
Analyze different ways to buy fertilizer	4.01 .77	2.36 .97
Determine appropriate method of harvesting to minimize cost	4.11 .73	2.59 1.08
Keep and analyze production records for the crops	4.33 .80	2.34 1.01
Budget the annual cost and return in crop production	4.27 .80	2.38 1.06
Analyze future production	4.00 .84	2.26 .99
Determine results obtained from adoption of new varieties of crops	3.96 .80	2.53 .95
Adjust production techniques based on latest research findings	3.93 .86	2.23 1.01

Table 6. Continued

Competency	Needed	Possessed
	Mean S.D.	Mean S.D.
Understand price support policy and government subsidies on various inputs and outputs	3.96 .87	2.13 1.03
Evaluate economic impact of careless crop handling	4.14 .79	2.45 1.06
Improve knowledge of crop production through various sources	4.03 .79	2.51 .91
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	4.12 .75	2.50 .90
Have mathematical abilities (can add, subtract, multiply, and divide)	4.22 .89	2.48 1.32
Determine fertilization rates required for maximum yield	4.07 .86	2.60 1.12
Use weather information to reduce risk in crop harvesting	3.81 .86	2.12 .98
Describe the problems involved in marketing various crops	3.91 .83	2.33 1.08
Provide financing through credit agencies	4.11 .76	2.56 .92
Determine the benefit of owning or renting farm machinery	4.19 .78	2.72 .91
Understand how to use credit	4.15 .71	2.79 .95
Label varieties of crop	3.84 .88	2.11 1.03
Determine the methods of selling crops	3.85 .75	2.35 1.15

Table 6. Continued

Competency	Needed	Possessed
	Mean S.D.	Mean S.D.
Aware of seasonal price changes	3.96 .78	2.30 1.14
Make grades of the crop to meet the market standards	3.88 .78	2.09 .92
Package the crop when needed for sale	3.91 .79	2.22 1.04
Use proper storage for crops	4.01 .84	2.58 .92
Go to the market with the crops	3.85 .80	2.51 .90
Loading and unloading the crop	3.82 .73	2.47 .91
Treat stored crops for pest control	3.85 .76	2.33 .93
Collect and interpret crops market information	3.78 .84	2.02 .98
Understand the best time to market different crops	4.13 .86	2.44 1.05
Identify various sources of crops market information	3.87 .88	2.07 .91
Understand future markets and contracts	3.77 .96	1.91 .90
Know best route and most economical transportation from farm to market	3.96 .84	2.56 1.18
Overall mean	4.02 .60	2.42 .76

The highest mean (2.94) for degree of competence possessed by the farmers was for "select profitable crops". The second highest mean (2.90) was for "calculate the quantity of seed needed to plant a fixed number of acres".

Other competencies with means between 2.50 and 2.94 were: (1) schedule plantings at proper time (2.85); (2) understand how to use credit (2.79); (3) determine the benefit of owning or renting farm machinery (2.72); (4) select sites suitable for crops (2.71); (5) determine fertilization rates required for maximum yield (2.60); (6) understand the importance of crop rotation (2.59); (7) determine appropriate method of harvesting to minimize cost (2.59); (8) use proper storage for the crops (2.58); (9) provide financing through credit agencies (2.56); (10) know best route and most economical transportation from farm to market (2.56); (11) determine results obtained from adoption of new varieties of crops (2.53); (12) improve knowledge of crop production through various sources (2.51); (13) go to the market with the crops (2.51); and (14) adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns (2.50).

Only one competency had a mean score lower than 2.00 (1.91) for competence possessed. This competency was "understand future markets and contracts". It can be concluded that the respondents possessed low economic competence.

Perceptions of Agriculture Officers

Table 7 shows the means and standard deviations for the competencies needed by the farmers as perceived by agriculture officers. The overall mean computed for degree of competence needed was 4.10 with a standard deviation of .41. All of the competencies were rated above 3.50 out of a possible rating of 5.00. Twenty-seven competencies had a mean of 4.00 or above.

As perceived by agriculture officers, the highest mean (4.69) for degree of competence needed by the farmers was "understand how to use credit". The second highest mean (4.50) for degree of competence needed by the farmers was for "have mathematical abilities (can add, subtract, multiply and divide)".

Other competencies with "high competence needed" (4.00 or above mean) as perceived by agriculture officers were: (1) adjust production techniques based on latest research findings (4.46); (2) budget the annual cost and return in crop production (4.42); (3) keep and analyze production records for the crops (4.34); (4) schedule plantings at proper time (4.30); (5) calculate the quantity of seed needed to plant a fixed number of acres (4.26); (6) select sites suitable for the crops (4.19); (7) understand price support policy and government subsidies on various inputs and outputs (4.19); (8) select profitable crops (4.15); (9) determine

results obtained from adoption of new varieties of crops (4.15); (10) understand the best time to market different crops (4.15); (11) provide financing through credit agencies (4.07); (12) determine the methods of selling crops (4.07); (13) understand the importance of crop rotation (4.03); (14) treat stored crops for pest control (4.03); (15) identify various sources of crops market information (4.03); (16) make grades of the crop to meet the market standards (4.00); (17) know best route and most economical transportation from farm to market (4.00).

Eight competencies needed by farmers as perceived by the agriculture officers had the same mean score (4.11). These were: (1) determine appropriate method of harvesting to minimize cost; (2) improve knowledge of crop production through various sources; (3) adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns; (4) determine fertilization rates required for maximum yield; (5) describe the problems involved in marketing various crops; (6) aware of seasonal price changes; (7) use proper storage for crops; and (8) collect and interpret crops market information.

It may be concluded that agriculture officers perceived a need for all of economic competencies by farmers in their area.

Table 7. Agriculture officers' perceptions of the economic competencies needed and possessed by farmers

Competency	Needed	Possessed
	Mean S.D.	Mean S.D.
Select profitable crops	4.15 .88	3.03 .87
Select sites suitable for crops	4.19 .74	2.61 .49
Schedule plantings at proper time	4.30 .78	2.80 .56
Calculate the quantity of seed needed to plant a fixed number of acres	4.26 .77	2.88 .81
Understand the importance of crop rotation	4.03 .72	2.03 .52
Analyze different ways to buy fertilizer	3.84 .73	2.30 .67
Determine appropriate method of harvesting to minimize cost	4.11 .90	2.42 .75
Keep and analyze production records for the crops	4.34 .93	2.00 .63
Budget the annual cost and return in crop production	4.42 .75	2.11 .71
Analyze future production	3.96 .72	2.07 .62
Determine results obtained from adoption of new varieties of crops	4.15 .67	2.46 .76
Adjust production techniques based on latest research findings	4.46 .58	2.11 .71

Table 7. Continued

Competency	Needed	Possessed
	Mean S.D.	Mean S.D.
Understand price support policy and government subsidies on various inputs and outputs	4.19 .69	2.00 .74
Evaluate economic impact of careless crop handling	3.96 .44	2.26 .60
Improve knowledge of crop production through various sources	4.11 .58	2.42 .64
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	4.11 .58	2.38 .69
Have mathematical abilities (can add, subtract, multiply, and divide)	4.50 .76	2.11 .51
Determine fertilization rates required for maximum yield	4.11 .65	2.53 .70
Use weather information to reduce risk in crop harvesting	3.88 .71	2.07 .84
Describe the problems involved in marketing various crops	4.11 .65	2.88 .95
Provide financing through credit agencies	4.07 .62	2.76 .51
Determine the benefit of owning or renting the farm machinery	3.80 .56	2.30 .73
Understand how to use credit	4.69 .47	2.00 .80
Label varieties of crop	3.92 .48	2.11 .58
Determine the methods of selling crops	4.07 .62	2.30 .61

Table 7. Continued

Competency	Needed	Possessed
	Mean S.D.	Mean S.D.
Aware of seasonal price changes	4.11 .51	2.38 .75
Make grades of the crop to meet the market standards	4.00 .56	2.07 .68
Package the crop when needed for sale	3.96 .52	2.50 .76
Use proper storage for crops	4.11 .58	2.57 .64
Go to the market with the crops	3.80 .69	2.50 .86
Loading and unloading the crop	3.84 .73	2.46 .76
Treat stored crops for pest control	4.03 .59	2.15 .83
Collect and interpret crops market information	4.11 .58	2.00 .80
Understand the best time to market different crops	4.15 .61	2.57 .64
Identify various sources of crops market information	4.03 .66	2.15 .67
Understand future markets and contracts	3.96 .66	1.96 .82
Know best route and most economical transportation from farm to market	4.00 .56	2.61 .85
Overall mean	4.10 .41	2.35 .41

Table 7 also shows the means and standard deviations for the competencies possessed by the farmers as perceived by agriculture officers. The overall mean for degree of competence possessed was 2.35. Only one competency was rated above 3.00 out of a possible rating of 5.00. Eleven competencies had means between 2.50 and 3.00.

The highest mean score (3.03) for degree of competence possessed by farmers as perceived by agriculture officers was for "select profitable crops". Farmers also identified this as the most possessed competency. The second highest mean score (2.88) for degree of competence possessed by farmers was shared by two competencies: (1) calculate the quantity of seed needed to plant a fixed number of crops, and (2) describe the problems involved in marketing various crops. It was also found that the farmers rated these competencies among the highest possessed by themselves.

Other competencies with much competence possessed (2.50 - 2.80 mean) as perceived by agriculture officers were: (1) schedule plantings at proper time (2.80); (2) provide financing through credit agencies (2.76); (3) select sites suitable for crops (2.61); (4) know best route and most economical transportation from farm to market (2.61); (5) use proper storage for the crops (2.57); (6) understand the best time to market different crops (2.57); (7) determine fertilization rates required for maximum yield (2.53); (8) package the crop

when needed for sale (2.50); and (9) go to market with the crop (2.50).

It was concluded that agriculture officers perceived that the farmers in their area possessed limited economic competencies.

Testing of Hypotheses

The first null hypothesis tested was as follows:

There are no significant differences in the level of economic competencies needed by farmers and the level possessed as perceived by the farmers themselves.

The data in Table 8 show the means, standard deviations, and t-values (paired t-test) for the economic competencies needed by farmers. A significant difference was observed at the 0.01 level of probability between the needed mean and the possessed mean for all competencies. Therefore, null hypothesis one was rejected. A significant difference existed between the level of competence needed and the level of competence possessed by farmers for all economic competencies included in the study. This investigation revealed that the farmers themselves believed that all the 37 competencies are needed, but that the level of competency they possessed is very limited. Therefore, it can be concluded that farmers need to improve their economic competencies to enhance their farming productivity.

Table 8. Test for significant differences between economic competencies needed and possessed by farmers as perceived by themselves

Competency	Needed Mean S.D.	Possessed Mean S.D.	t-value
Select profitable crops	4.25 .72	2.94 1.03	17.74**
Select sites suitable for crops	4.16 .67	2.71 1.11	16.09**
Schedule plantings at proper time	4.18 .72	2.85 1.05	16.11**
Calculate the quantity of seed needed to plant a fixed number of acres	4.19 .70	2.90 .92	16.63**
Understand the importance of crop rotation	4.22 .71	2.59 .92	22.54**
Analyze different ways to buy fertilizer	4.01 .77	2.36 .97	21.64**
Determine appropriate method of harvesting to minimize cost	4.11 .73	2.59 1.08	15.93**
Keep and analyze production records for the crops	4.33 .80	2.34 1.01	20.35**
Budget the annual cost and return in crop production	4.27 .80	2.38 1.06	20.60**
Analyze future production	4.00 .84	2.26 .99	20.73**
Determine results obtained from adoption of new varieties of crops	3.96 .80	2.53 .95	21.48**
Adjust production techniques based on latest research findings	3.93 .86	2.23 1.01	19.57**

**Significant at the 0.01 level.

Table 8. Continued

Competency	Needed Mean S.D.	Possessed Mean S.D.	t-value
Understand price support policy and government subsidies on various inputs and outputs	3.96 .87	2.13 1.03	20.13**
Evaluate economic impact of careless crop handling	4.14 .79	2.45 1.06	21.66**
Improve knowledge of crop production through various sources	4.03 .79	2.51 .91	18.54**
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	4.12 .75	2.50 .90	18.29**
Have mathematical abilities (can add, subtract, multiply, and divide)	4.22 .89	2.48 1.32	14.60**
Determine fertilization rates required for maximum yield	4.07 .86	2.60 1.12	16.41**
Use weather information to reduce risk in crop harvesting	3.81 .86	2.12 .98	19.21**
Describe the problems involved in marketing various crops	3.91 .83	2.33 1.08	17.63**
Provide financing through credit agencies	4.11 .76	2.56 .92	17.83**
Determine the benefit of owning or renting farm machinery	4.19 .78	2.72 .91	20.08**
Understand how to use credit	4.15 .71	2.79 .95	16.63**
Label varieties of crop	3.84 .88	2.11 1.03	19.04**
Determine the methods of selling crops	3.85 .75	2.35 1.15	17.33**

Table 8. Continued

Competency	Needed	Possessed	
	Mean S.D.	Mean S.D.	t- value
Aware of seasonal price changes	3.96 .78	2.30 1.14	18.16**
Make grades of the crop to meet the market standards	3.88 .78	2.09 .92	23.16**
Package the crop when needed for sale	3.91 .79	2.22 1.04	19.40**
Use proper storage for crops	4.01 .84	2.58 .92	19.10**
Go to the market with the crops	3.85 .80	2.51 .90	20.01**
Loading and unloading the crop	3.82 .73	2.47 .91	17.72**
Treat stored crops for pest control	3.85 .76	2.33 .93	17.33**
Collect and interpret crops market information	3.78 .84	2.02 .98	18.84**
Understand the best time to market different crops	4.13 .86	2.44 1.05	22.06**
Identify various sources of crops market information	3.87 .88	2.07 .91	23.85**
Understand future markets and contracts	3.77 .96	1.91 .90	22.39**
Know best route and most economical transportation from farm to market	3.96 .84	2.56 1.18	15.80**
Overall mean	4.02 .60	2.42 .76	35.11**

The second null hypothesis tested was as follows:

There are no significant differences in the level of economic competencies needed by farmers and the level possessed as perceived by the agriculture officers.

Table 9 shows that the agriculture officers perceived the economic competence of farmers in the same way farmers perceived themselves. Agriculture officers perceived that farmers possessed less competence than needed. A significant difference was observed between "needed" and "possessed" for all the competencies at 0.01 level. Therefore, null hypothesis 2 was rejected. It can be concluded that all 37 economic competencies were needed by the farmers, but that the level of competence possessed was very limited.

The third null hypothesis tested was as follows:

There are no significant differences between the perceptions of the farmers and the perceptions of agriculture officers regarding the importance of economic competencies needed by farmers.

Means, standard deviations, and t-values for test of significant differences between the perceptions of the farmers and the perceptions of agriculture officers for the degree of economic competence needed by farmers are presented in Table 10. A significant difference was found between perceptions of the farmers and the agriculture officers for only four of the 37 economic competencies needed by farmers.

Table 9. Test for significant differences between economic competencies needed and possessed by farmers as perceived by agriculture officers

Competency	Needed	Possessed	
	Mean S.D.	Mean S.D.	t-value
Select profitable crops	4.15 .88	3.03 .87	11.02**
Select sites suitable for crops	4.19 .74	2.61 .49	11.44**
Schedule plantings at proper time	4.30 .78	2.80 .56	8.45**
Calculate the quantity of seed needed to plant a fixed number of acres	4.26 .77	2.88 .81	7.18**
Understand the importance of crop rotation	4.03 .72	2.03 .52	14.72**
Analyze different ways to buy fertilizer	3.84 .73	2.30 .67	11.11**
Determine appropriate method of harvesting to minimize cost	4.11 .90	2.42 .75	8.89**
Keep and analyze production records for the crops	4.34 .93	2.00 .63	11.76**
Budget the annual cost and return in crop production	4.42 .75	2.11 .71	12.68**
Analyze future production	3.96 .72	2.07 .62	13.51**
Determine results obtained from adoption of new varieties of crops	4.15 .67	2.46 .76	9.76**
Adjust production techniques based on latest research findings	4.46 .58	2.11 .71	17.35**

** Significant at 0.01 level.

Table 9. Continued

Competency	Needed Mean S.D.	Possessed Mean S.D.	t-value
Understand price support policy and government subsidies on various inputs and outputs	4.19 .69	2.00 .74	10.95**
Evaluate economic impact of careless crop handling	3.96 .44	2.26 .60	12.70**
Improve knowledge of crop production through various sources	4.11 .58	2.42 .64	13.97**
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns.	4.11 .58	2.38 .69	14.62**
Have mathematical abilities (can add, subtract, multiply, and divide)	4.50 .76	2.11 .51	15.13**
Determine fertilization rates required for maximum yield	4.11 .65	2.53 .70	13.92**
Use weather information to reduce risk in crop harvesting	3.88 .71	2.07 .84	11.51**
Describe the problems involved in marketing various crops	4.11 .65	2.88 .95	8.21**
Provide financing through credit agencies	4.07 .62	2.76 .51	12.14**
Determine the benefit of owning or renting farm machinery	3.80 .56	2.30 .73	11.80**
Understand how to use credit	4.69 .47	2.00 .80	14.15**
Label varieties of crop	3.92 .48	2.11 .58	18.76**
Determine the methods of selling crops	4.07 .62	2.30 .61	11.07**

Table 9. Continued

Competency	Needed	Possessed	
	Mean S.D.	Mean S.D.	t- value
Aware of seasonal price changes	4.11 .51	2.38 .75	14.62**
Make grades of the crop to meet the market standards	4.00 .56	2.07 .68	13.18**
Package the crop when needed for sale	3.96 .52	2.50 .76	9.80**
Use proper storage for crops	4.11 .58	2.57 .64	11.11**
Go to the market with the crops	3.80 .69	2.50 .86	8.46**
Loading and unloading the crop	3.84 .73	2.46 .76	10.13**
Treat stored crops for pest control	4.03 .59	2.15 .83	11.12**
Collect and interpret crop market information	4.11 .58	2.00 .80	13.22**
Understand the best time to market different crops	4.15 .61	2.57 .64	11.44**
Identify various sources of crops market information	4.03 .66	2.15 .67	13.51**
Understand future markets and contracts	3.96 .66	1.96 .82	18.03**
Know best route and most economical transportation from farm to market	4.00 .56	2.61 .85	7.86**
Overall mean	4.10 .41	2.35 .41	25.93**

Table 10. Test for significant differences between economic competencies needed by farmers as perceived by farmers and agriculture officers

Competency	Farmers	Agriculture officers		
	Mean S.D.	Mean S.D.	t-value	prob.
Select profitable crops	4.25 .72	4.15 .88	0.62	.537
Select sites suitable for crops	4.16 .67	4.61 .74	-0.18	.858
Schedule plantings at proper time	4.18 .72	4.30 .78	-0.75	.456
Calculate the quantity of seed needed to plant a fixed number of acres	4.19 .70	4.26 .77	-0.46	.645
Understand the importance of crop rotation	4.22 .71	4.03 .72	1.19	.236
Analyze different ways to buy fertilizer	4.01 .77	3.84 .73	0.97	.332
Determine appropriate method of harvesting to minimize cost	4.11 .73	4.11 .90	-0.01	.991
Keep and analyze production records for the crops	4.33 .80	4.34 .93	-0.09	.929
Budget the annual cost and return in crop production	4.27 .80	4.42 .75	-0.83	.409
Analyze future production	4.00 .84	3.96 .72	0.21	.832
Determine results obtained from adoption of new varieties of crops	3.96 .80	4.15 .67	-1.07	.288
Adjust production techniques based on latest research findings	3.93 .86	4.46 .58	-3.64	.001

Table 10. Continued

Competency	Farmers	Agriculture officers		
	Mean S.D.	Mean S.D.	t-value	prob.
Understand price support policy and government subsidies on various inputs and outputs	3.96 .87	4.19 .69	-1.21	.230
Evaluate economic impact of careless crop handling	4.14 .79	3.96 .44	1.54	.128
Improve knowledge of crop production through various sources	4.03 .79	4.11 .58	-0.50	.615
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	4.12 .75	4.11 .58	0.50	.958
Have mathematical abilities(can add, subtract, multiply, and divide)	4.22 .89	4.50 .76	-1.42	.157
Determine fertilization rates required for maximum yield	4.07 .86	4.11 .65	-0.25	.804
Use weather information to reduce risk in crop harvesting	3.83 .86	3.88 .71	-0.27	.788
Describe the problems involved in marketing various crops	3.91 .83	4.11 .65	-1.12	.267
Provide financing through credit agencies	4.11 .76	4.07 .62	0.22	.823
Determine the benefit of owning or renting the farm machinery	4.19 .78	3.80 .56	2.36	.020
Understand how to use credit	4.15 .71	4.69 .47	-4.59	.001
Label varieties of crop	3.84 .88	3.92 .48	-0.60	.553
Determine the methods of selling crops.	3.85 .75	4.07 .62	-1.38	.170

Table 10. Continued

Competency	Farmers	Agriculture officers		
	Mean S.D.	Mean S.D.	t-value	prob.
Aware of seasonal price changes	3.96 .78	4.11 .51	-1.14	.260
Make grades of the crop to meet the market standards	3.88 .78	4.00 .56	-0.69	.494
Package the crop when needed for sale	3.91 .79	3.96 .52	-0.33	.739
Use proper storage for crops	4.01 .84	4.11 .58	-0.73	.468
Go to the market with the crops	3.85 .80	3.80 .69	0.28	.782
Loading and unloading the crop	3.82 .73	3.84 .73	-0.13	.895
Treat stored crops for pest control	3.85 .76	4.03 .59	-1.13	.261
Collect and interpret crop market information	3.78 .84	4.11 .58	-2.31	.025
Understand the best time to market different crops	4.13 .86	4.15 .61	-0.11	.913
Identify various sources of crops market information	3.87 .88	4.03 .66	-0.87	.384
Understand future market and contracts	3.77 .96	3.96 .66	-1.16	.251
Know best route and most economical transportation from farm to market	3.96 .84	4.00 .56	-0.22	.826
Overall mean	4.02 .60	4.10 .41	-0.80	.421

These were: (1) adjust production techniques based on latest research findings; (2) determine the benefit of owning or renting farm machinery; (3) understand how to use credit; (4) collect and interpret crops market information. For three of these competencies, the means for agriculture officer were higher than the farmers' means.

No significant difference was observed in the overall needed means for the perceptions of farmers and the perceptions of agriculture officers; therefore, null hypothesis three was not rejected.

The fourth null hypothesis tested was as follows:

There are no significant differences between the perceptions of the farmers and the perceptions of agriculture officers regarding the importance of economic competencies possessed by farmers.

In addition to determining the extent to which the 37 economic competencies were needed by farmers, this study also identified the degree to which the competencies were possessed by farmers.

Table 11 provides the means, standard deviations, and t-values for the economic competencies possessed by farmers as perceived by farmers themselves and agriculture officers. The data indicate that significant differences existed between the mean perceptions of the agriculture officers and the means for farmers for only six of the 37 economic compe-

Table 11. Test for significant differences between economic competencies possessed by farmers as perceived by farmers themselves and agriculture officers

Competency	Farmers	Agriculture officers		
	Mean S.D.	Mean S.D.	t-value	prob.
Select profitable crops	2.94 1.03	3.03 .87	-0.41	.685
Select sites suitable for crops	2.71 1.11	2.61 .49	0.64	.552
Schedule plantings at proper time	2.85 1.05	2.80 .56	0.31	.756
Calculate the quantity of seed needed to plant a fixed number of acres	2.90 .92	2.03 .81	0.11	.910
Understand the importance of crop rotation	2.59 .92	2.03 .52	4.01	.001
Analyze different ways to buy fertilizer	2.36 .97	2.30 .67	0.32	.750
Determine appropriate method of harvesting to minimize cost	2.59 1.08	2.42 .75	0.94	.349
Keep and analyze production records for the crops	2.34 1.01	2.00 .63	2.11	.039
Budget the annual cost and return in crop production	2.38 1.06	2.11 .71	1.51	.137
Analyze future production	2.26 .99	2.07 .62	1.20	.235
Determine results obtained from adoption of new varieties of crops	2.53 .95	2.46 .76	-0.55	.586
Adjust production techniques based on latest research findings	2.23 1.01	2.11 .71	0.70	.486

Table 11. Continued

Competency	Farmers	Agriculture officers		
	Mean S.D.	Mean S.D.	t-value	prob.
Understand price support policy and government subsidies on various inputs and outputs	2.13 1.03	2.00 .74	0.62	.539
Evaluate economic impact of careless crop handling	2.45 1.06	2.26 .60	1.15	.253
Improve knowledge of crop production through various sources	2.51 .91	2.42 .64	0.59	.558
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	2.50 .90	2.38 .69	0.63	.529
Have mathematical abilities (can add, subtract, multiply, and divide)	2.48 1.32	2.11 .51	2.19	.030
Determine fertilization rates required for maximum yield	2.60 1.12	2.53 .70	0.39	.699
Use weather information to reduce risk in crop harvesting	2.12 .98	2.07 .84	0.22	.825
Describe the problems involved in marketing various crops	2.33 1.08	2.88 .95	-2.37	.019
Provide financing through credit agencies	2.56 .92	2.76 .51	-1.47	.146
Determine the benefit of owning or renting farm machinery	2.72 .91	2.30 .73	2.14	.035
Understand how to use credit	2.79 .95	2.00 .80	3.88	.001
Label varieties of crop	2.11 1.03	2.11 .58	-0.01	.990
Determine the methods of selling crops	2.35 1.15	2.30 .61	0.25	.800

Table 11. Continued

Competency	Farmers	Agriculture officers		
	Mean S.D.	Mean S.D.	t-value	prob.
Aware of seasonal price changes	2.30 1.14	2.38 .75	-0.40	.689
Make grades of the crop to meet the market standards	2.09 .92	2.07 .68	0.08	.935
Package the crop when needed for sale	2.22 1.04	2.50 .76	-1.24	.216
Use proper storage for crops	2.58 .92	2.57 .64	0.07	.946
Go to the market with the crops	2.51 .90	2.50 .86	0.08	.938
Loading and unloading the crop	2.47 .91	2.46 .76	0.06	.948
Treat stored crops for pest control	2.33 .93	2.15 .83	0.87	.384
Collect and interpret crop market information	2.02 .98	2.00 .80	0.10	.922
Understand the best time to market different crops	2.44 1.05	2.57 .64	-0.81	.422
Identify various sources of crops market information	2.07 .91	2.15 .67	-0.42	.672
Understand future markets and contracts	1.91 .90	1.96 .82	-0.22	.824
Know best route and most economical transportation from farm to market	2.56 1.18	2.61 .85	-0.19	.846
Overall mean	2.42 .76	2.35 .41	0.67	.500

tencies. These were: (1) understand the importance of crop rotation; (2) keep and analyze production records for the crops; (3) have mathematical abilities (can add, subtract, multiply, and divide); (4) describe the problems involved in marketing crops; (5) determine the benefit of owning or renting farm machinery; and (6) understand how to use credit. For most of these competencies, the means for the farmers were higher than those of the agriculture officers.

No significant difference existed between the overall mean perceptions of farmers and the overall mean perceptions of agriculture officers; therefore, null hypothesis 4 was not rejected.

The fifth null hypothesis tested was as follows:

There are no significant differences in the perceptions of farmers regarding the importance of economic competencies needed and possessed when grouped according to:

1) educational level,

2) years of farming experience, and

3) tenancy status.

The one-way analysis of variance test was used to determine if significant differences existed in the level of importance when farmers were grouped by selected demographic variables: years of farming experience, level of education and tenancy status. The Scheffé test was used to identify

differences among groups when significant difference (0.05 level) was found.

Table 12 reports the means, standard deviations, and F-ratio for importance ratings of the economic competencies needed as perceived by farmers when grouped by years of farming experience. No significant difference was observed in the overall mean for the economic competencies. However, significant difference, at the 0.05 level, existed in one competency "understand how to use credit". The Scheffé test indicated that this difference was between group 1 and 2. Farmers who had been farming for 1 to 10 years rated this competency significantly higher than the farmers who had 11 to 20 years of farming experience.

No significant difference existed among the overall mean when grouped by years of farming experience. Therefore, null hypothesis 5 was not rejected. It was concluded that there was agreement on the degree of economic competence needed by farmers regardless of years of farming experience.

Table 13 shows means, standard deviations and F-ratios for economic competencies possessed by farmers when grouped by their years of farming experience. No significant difference was found in the overall means for the groups. Therefore the null hypothesis was not rejected. However, a significant difference at the 0.05 level was observed in the means for "understand the best time to market different

Table 12. Test for significant differences in economic competencies needed when farmers were grouped by years of farming experience

Competency	Years of farming experience				
	1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Select profitable crops	4.30 .55	4.22 .77	4.26 .78	.08	.916
Select sites suitable for crops	4.26 .54	4.11 .72	4.16 .69	.35	.700
Schedule plantings at proper time	4.30 .55	4.15 .77	4.13 .77	.40	.665
Calculate the quantity of seed needed to plant a fixed number of acres	4.39 .49	4.15 .74	4.10 .75	1.23	.294
Understand the importance of crop rotation	4.43 .58	4.22 .74	4.06 .73	1.75	.178
Analyze different ways to buy fertilizer	4.08 .66	4.02 .76	3.93 .86	.26	.767
Determine appropriate method of harvesting to minimize cost	4.21 .59	4.11 .75	4.03 .80	.40	.668
Keep and analyze production records for the crops	4.60 .58	4.31 .77	4.13 .93	2.37	.098
Budget the annual cost and return in crop production	4.47 .51	4.20 .85	4.23 .89	.95	.390

[a]1 = Group 1, 1-10 years of farming experience;
2 = Group 2, 11-20 years of farming experience;
3 = Group 3, Over 20 years of farming experience.

Table 12. Continued

Competency	Years of farming experience: 1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Analyze future production	4.26 .61	4.02 .92	3.76 .81	2.33	.102
Determine results obtained from adoption of new varieties of crops	4.21 .59	3.93 .84	3.83 .87	1.56	.213
Adjust production techniques based on latest research findings	4.17 .57	3.93 .92	3.76 .93	1.46	.236
Understand price support policy and government subsidies on various inputs and outputs	4.08 .84	3.90 .93	3.96 .80	.31	.734
Evaluate economic impact of careless crop handling	4.30 .63	4.06 .81	4.13 .86	.67	.512
Improve knowledge of crop production through various sources	4.13 .54	4.09 .77	3.86 .97	.94	.393
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	4.26 .61	4.15 .77	3.96 .80	1.08	.342
Have mathematical abilities (can add, subtract, multiply, and divide)	4.43 .58	4.13 1.02	4.20 .88	.85	.428

Table 12. Continued

Competency	Years of farming experience: 1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Determine fertilization rates required for maximum yield	4.17 .57	4.00 .91	4.10 .84	.36	.698
Use weather information to reduce risk in crop harvesting	4.08 .90	3.72 .84	3.80 .84	1.36	.261
Describe the problems involved in marketing various crops	4.17 .65	3.88 .92	3.76 .81	1.61	.204
Provide financing through credit agencies	4.17 .71	4.15 .80	4.00 .74	.47	.621
Determine the benefit of owning or renting farm machinery	4.43 .50	4.06 .84	4.20 .84	1.66	.194
Understand how to use credit	4.43 .50	3.97 .76	4.20 .71	3.36	.038
Label varieties of crop	4.13 .54	3.75 .94	3.76 .97	1.59	.207
Determine the methods of selling crops	4.13 .54	3.77 .83	3.76 .72	2.06	.131
Aware of seasonal price changes	4.21 .67	3.86 .76	3.93 .86	1.60	.206
Make grades of the crop to meet the market standards	4.13 .69	3.90 .80	3.66 .80	2.34	.101
Package the crop when needed for sale	4.08 .66	3.88 .81	3.83 .87	.71	.493

Table 12. Continued

Competency	Years of farming experience				
	1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Use proper storage for crops	3.95 .76	4.02 .82	4.03 .96	.06	.941
Go to the market with the crops	3.91 .59	3.79 .87	3.90 .84	.22	.799
Loading and unloading the crop	3.86 .54	3.79 .76	3.83 .84	.07	.925
Treat stored crops for pest control	3.91 .59	3.81 .78	3.86 .86	.11	.888
Collect and interpret crop market information	3.91 .51	3.75 .78	3.73 .94	.35	.703
Understand the best time to market different crops	4.34 .64	4.00 .94	4.16 .87	1.26	.285
Identify various sources of crops market information	4.08 .59	3.84 .96	3.76 .93	.92	.400
Understand future markets and contracts	3.91 1.04	3.70 .95	3.76 .93	.35	.705
Know best route and most economical transportation from farm to market	4.04 .70	3.86 .90	4.06 .86	.62	.538
Overall mean	4.19 .34	3.98 .65	3.96 .65	1.14	.323

Table 13. Test for significant differences in economic competencies possessed when farmers were grouped by years of farming experience

Competency	Years of farming experience				
	1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Select profitable crops	3.26 1.00	2.57 .96	3.00 1.11	1.93	.150
Select sites suitable for crops	2.95 1.10	2.43 1.04	2.93 1.17	2.60	.079
Schedule plantings at proper time	3.17 .98	2.57 1.05	2.76 1.07	1.39	.252
Calculate the quantity of seed needed to plant a fixed number of acres	3.26 .86	2.72 .97	2.90 .84	2.59	.079
Understand the importance of crop rotation	2.78 .79	2.52 .95	2.56 .97	.62	.538
Analyze different ways to buy fertilizer	2.43 .94	2.27 .92	2.43 1.07	.32	.721
Determine appropriate method of harvesting to minimize cost	2.73 1.13	2.52 1.04	2.60 1.13	.29	.745
Keep and analyze production records for the crops	2.34 1.07	2.22 .96	2.50 1.07	.63	.532
Budget the annual cost and return in crop production	2.26 .91	2.25 1.03	2.66 1.18	1.57	.212

[a]1 = Group 1, 1-10 years of farming experience;
2 = Group 2, 11-20 years of farming experience;
3 = Group 3, Over 20 years of farming experience.

Table 13. Continued

Competency	Years of farming experience: 1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Analyze future production	2.21 .99	2.15 .93	2.46 1.07	.88	.414
Determine results obtained from adoption of new varieties of crops	2.47 .79	2.34 .98	2.26 1.04	.31	.729
Adjust production techniques based on latest research findings	2.34 .88	2.06 .92	2.40 1.22	1.12	.328
Understand price support policy and government subsidies on various inputs and outputs	2.30 1.01	2.09 1.05	2.06 1.04	.40	.667
Evaluate economic impact of careless crop handling	2.69 1.10	2.27 .92	2.53 1.19	1.33	.268
Improve knowledge of crop production through various sources	2.69 .87	2.36 .91	2.60 .93	1.18	.309
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	2.69 .87	2.45 .92	2.43 .89	.67	.513
Have mathematical abilities (can add, subtract, multiply, and divide)	2.95 1.49	2.36 1.29	2.30 1.17	1.97	.144

Table 13. Continued

Competency	Years of farming experience: 1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Determine fertilization rates required for maximum yield	3.00 1.00	2.40 1.08	2.60 1.22	2.14	.123
Use weather information to reduce risk in crop harvesting	2.17 .93	1.95 .86	2.33 1.15	1.37	.257
Describe the problems involved in marketing various crops	2.65 1.11	2.25 1.10	2.20 1.03	1.35	.263
Provide financing through credit agencies	2.56 .89	2.54 1.86	2.60 .72	.03	.969
Determine the benefit of owning or renting farm machinery	2.82 .88	2.68 .95	2.70 .87	.19	.820
Understand how to use credit	2.95 .87	2.63 1.01	2.90 .92	1.11	.331
Label varieties of crop	2.17 .88	2.00 .96	2.23 1.22	.50	.605
Determine the methods of selling crops	2.65 1.02	2.18 1.24	2.36 1.09	1.26	.287
Aware of seasonal price changes	2.47 1.12	2.09 1.03	2.50 1.27	1.49	.229
Make grades of the crop to meet the market standards	2.21 .95	2.06 .92	2.03 .92	.28	.755
Package the crop when needed for sale	2.34 .98	2.20 1.00	2.16 1.17	.21	.810

Table 13. Continued

Competency	Years of farming experience				
	1 N=23 Mean S.D.	2 N=44 Mean S.D.	3[a] N=30 Mean S.D.	F-ratio	F-prob.
Use proper storage for crops	2.52 .73	2.56 .92	2.66 1.06	.17	.839
Go to the market with the crops	2.69 .82	2.43 .87	2.50 1.00	.64	.526
Loading and unloading the crop	2.69 .87	2.36 .78	2.46 1.10	.99	.372
Treat stored crops for pest control	2.69 .92	2.25 .89	2.16 .94	2.46	.090
Collect and interpret crop market information	2.13 .91	1.90 .91	2.10 1.15	.51	.600
Understand the best time to market different crops	2.82 1.23	2.18 .89	2.53 1.04	3.13	.048
Identify various sources of crops market information	2.43 1.07	1.90 .83	2.03 .85	2.61	.078
Understand future markets and contracts	2.08 1.08	1.88 .86	1.83 .83	.54	.579
Know best route and most economical transportation from farm to market	2.86 .96	2.45 1.22	2.50 1.27	.98	.376
Overall mean	2.61 .70	2.31 .74	2.45 .82	1.18	.309

crops". The Scheffé test indicated that the difference was between group 1 and 2. Farmers who had 1 to 10 years of farming experience rated this competency significantly higher than farmers with 11 to 20 years of farming experience.

As farmers when grouped by their educational level, several highly significant differences between group means were observed. The results of these analyses are presented in Table 14. Of the 37 competencies needed, 20 competencies had significant differences among the means groups at the 0.05 level. Significant difference existed among the overall means for the degree of competence needed by farmers when grouped by educational level. Therefore, the null hypothesis was rejected. The means for the educated groups (high school education or more) were significantly higher from the means of the other three groups for most of the competencies needed.

The analysis of the economic competencies possessed by farmers when grouped by educational level showed several highly significant differences among group means. The results of these analyses are presented in Table 15. Of the 37 competencies possessed, 25 had significant differences between the means of the respondent groups at 0.05 or 0.01 level.

Highly significant differences (0.01 level) were found in the overall mean for the degree of competence possessed by

Table 14. Test for significant differences in economic competencies needed when farmers were grouped by educational level

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Select profitable crops	4.07 .62	4.21 .75	4.10 .85	4.73 .72	3.98	.010
Select sites suitable for crops	3.86 .52	4.18 .73	4.05 .75	4.52 .51	3.00	.034
Schedule plantings at proper time	4.19 .74	4.18 .69	3.90 .78	4.47 .61	2.09	.106
Calculate the quantity of seed needed to plant a fixed number of acres	4.07 .79	4.25 .71	4.05 .68	4.42 .61	1.26	.291
Understand the importance of crop rotation	3.92 .68	4.37 .65	4.10 .78	4.52 .61	3.62	.015
Analyze different ways to buy fertilizer	3.88 .81	4.12 .75	3.85 .81	4.15 .68	.98	.402
Determine appropriate method of harvesting to minimize cost	3.92 .74	4.34 .74	3.90 .71	4.21 .63	2.40	.072
Keep and analyze production records for the crops	4.61 .75	4.18 .85	3.95 .82	4.57 .50	3.87	.011

[a]1 = Group 1, No education at all;
2 = Group 2, Primary education;
3 = Group 3, Secondary education;
4 = Group 4, High shcool and more education.

Table 14. Continued

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Budget the annual cost and return in crop production	4.50 .76	4.15 .80	3.85 .87	4.63 .49	4.50	.005
Analyze future production	3.88 .81	4.03 .96	3.80 .83	4.31 .58	1.46	.228
Determine results obtained from adoption of new varieties of crops	3.84 .61	3.90 .96	3.75 .78	4.47 .61	3.46	.019
Adjust production techniques based on latest research findings	3.76 .71	3.75 1.01	3.90 .85	4.52 .51	4.16	.008
Understand price support policy and government subsidies on various inputs and outputs	3.84 .73	3.87 1.07	3.80 .83	4.47 .51	2.82	.043
Evaluate economic impact of careless crop handling	4.00 .74	4.21 .83	3.90 .91	4.47 .51	2.19	.093
Improve knowledge of crop production through various sources	3.92 .89	4.09 .81	3.85 .87	4.26 .45	1.11	.348
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	3.84 .78	4.18 .78	3.95 .68	4.57 .50	4.32	.006

Table 14. Continued

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Have mathematical abilities (can add, subtract, multiply, and divide)	4.42 .94	4.06 .98	4.00 .85	4.47 .61	1.72	.167
Determine fertilization rates required for maximum yield	4.07 .68	4.00 .95	3.95 .82	4.31 .74	.78	.505
Use weather information to reduce risk in crop harvesting	3.76 .51	3.90 1.02	3.60 .68	4.05 1.07	1.02	.386
Describe the problems involved in marketing various crops	3.88 .81	3.96 .99	3.60 .75	4.21 .53	1.81	.146
Provide financing through credit agencies	3.92 .68	4.12 .83	4.15 .87	4.31 .58	1.00	.394
Determine the benefit of owning or renting farm machinery	4.03 .82	4.15 .80	4.15 .87	4.52 .51	1.54	.208
Understand how to use credit	3.92 .62	4.21 .75	3.95 .68	4.57 .68	4.17	.008
Label varieties of crop	3.53 .76	3.90 1.05	3.80 .76	4.21 .71	2.29	.083
Determine the methods of selling crops	3.50 .70	3.93 .71	3.70 .65	4.36 .68	6.18	.001
Aware of seasonal price changes	3.57 .70	4.12 .83	3.85 .74	4.36 .59	4.93	.003
Make grades of the crop to meet the market standards	3.57 .75	4.06 .84	3.70 .73	4.21 .63	3.57	.017

Table 14. Continued

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Package the crop when needed for sale	3.61 .69	4.09 .85	3.80 .83	4.15 .68	2.59	.057
Use proper storage for crops	3.57 .80	4.18 .85	4.00 .85	4.31 .67	3.87	.011
Go to the market with the crops	3.53 .70	4.00 .98	3.75 .71	4.15 .50	2.86	.040
Loading and unloading the crop	3.46 .58	4.00 .84	3.80 .76	4.05 .52	3.59	.016
Treat stored crops for pest control	3.50 .70	3.93 .87	3.90 .71	4.15 .50	3.22	.026
Collect and interpret crop market information	3.42 .75	3.93 .98	3.75 .78	4.05 .62	2.72	.048
Understand the best time to market different crops	4.07 .79	4.21 1.03	3.80 .76	4.42 .60	1.89	.135
Identify various sources of crops market information	3.80 .84	3.90 .99	3.70 .92	4.10 .60	.75	.522
Understand future markets and contracts	3.73 .87	3.59 .04	3.55 .94	4.36 .76	3.40	.020
Know best route and most economical transportation from farm to market	3.69 .67	4.00 1.04	3.80 .76	4.47 .51	3.74	.013
Overall mean	3.86 .49	4.06 .66	3.86 .68	4.35 .35	3.34	.022

Table 15. Test for significant differences in economic competencies possesssed when farmers were grouped by educational level

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Select profitable crops	2.69 .97	2.90 1.08	2.70 1.03	3.63 .76	4.04	.009
Select sites suitable for crops	2.46 .94	2.68 1.17	2.40 1.09	3.42 1.01	3.81	.012
Schedule plantings at proper time	2.73 .96	2.75 1.13	2.50 1.00	3.57 .76	4.42	.005
Calculate the quantity of seed needed to plant fixed number of acres	2.84 .92	2.81 .93	2.65 .81	3.42 .90	2.76	.046
Understand the importance of crop rotation	2.23 .51	2.65 1.06	2.45 .94	3.15 .83	4.35	.006
Analyze different ways to buy fertilizer	2.26 .82	2.34 1.20	2.15 .87	2.73 .73	1.36	.259
Determine appropriate method of harvesting to minimize cost	2.34 .89	2.56 1.10	2.35 1.13	3.26 1.04	3.44	.019
Keep and analyze production records for the crops	2.15 .78	2.25 1.04	2.10 1.07	3.00 1.00	3.68	.014

[a]1 = Group 1, No education at all;
2 = Group 2, Primary education;
3 = Group 3, Secondary education;
4 = Group 4, High school and more education.

Table 15. Continued

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Budget the annual cost and return in crop production	2.46 .98	2.31 1.17	2.00 .97	2.78 .97	1.93	.129
Analyze future production	2.19 .84	2.34 1.15	2.05 1.05	2.47 .84	.69	.556
Determine results obtained from adoption of new varieties of crops	2.11 .58	2.34 1.03	2.15 .93	2.89 1.10	3.04	.032
Adjust production techniques based on latest research findings	2.07 .68	2.12 1.15	2.10 1.02	2.78 1.03	2.43	.069
Understand price support policy and government subsidies on various inputs and outputs	2.07 .79	1.90 1.14	1.95 .94	2.78 1.03	3.54	.017
Evaluate economic impact of careless crop handling	2.19 .80	2.40 1.07	2.30 1.21	3.05 1.02	2.86	.040
Improve knowledge of crop production through various sources	2.23 .71	2.40 .91	2.45 1.05	3.15 .76	4.62	.004
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	2.11 .51	2.46 .91	2.45 .99	3.15 .89	5.69	.001

Table 15. Continued

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Have mathematical abilities (can add, subtract, multiply, and divide)	1.69 .54	2.25 1.21	2.50 1.31	3.94 1.12	16.63	.001
Determine fertilization rates required for maximum yield	2.34 .68	2.50 1.27	2.45 1.14	3.31 1.10	3.46	.019
Use weather information to reduce risk in crop harvesting	2.03 .82	2.18 1.14	2.00 1.07	2.26 .80	.33	.798
Describe the problems involved in marketing various crops	1.96 .52	2.34 1.15	2.25 1.29	2.89 1.14	2.90	.038
Provide financing through credit agencies	2.07 .79	2.75 .95	2.60 .88	2.89 .87	4.01	.009
Determine the benefit of owning or renting farm machinery	2.26 .66	2.78 .94	2.60 .88	3.36 .83	6.44	.001
Understand how to use credit	2.61 .63	2.71 .95	2.65 1.18	3.31 .94	2.51	.063
Label varieties of crop	2.03 .82	2.03 1.12	2.00 1.21	2.47 .90	.96	.410
Determine the methods of selling crops	2.07 .68	2.25 1.21	2.10 1.07	3.15 1.34	4.39	.006
Aware of seasonal price changes	2.15 .88	2.31 1.20	1.90 1.11	2.94 1.17	3.21	.026
Make grades of the crop to meet the market standards	1.96 .66	2.25 1.07	1.75 .91	2.36 .89	2.02	.116

Table 15. Continued

Competency	Educational level 1 N=26 Mean S.D.	2 N=32 Mean S.D.	3 N=20 Mean S.D.	4[a] N=19 Mean S.D.	F-ratio	F-prob.
Package the crop when needed for sale	2.11 .71	2.34 1.26	1.80 1.00	2.63 .95	2.39	.073
Use proper storage for crops	2.57 .80	2.59 1.01	2.30 .80	2.89 .99	1.37	.256
Go to the market with the crops	2.50 .76	2.56 1.10	2.40 .75	2.57 .90	.16	.918
Loading and unloading the crop	2.34 .56	2.56 1.13	2.25 .78	2.73 .99	1.20	.313
Treat stored crops for pest control	2.15 .61	2.18 .93	2.15 .93	3.00 1.05	4.52	.005
Collect and interpret crop market information	1.88 .86	2.00 1.04	1.70 .92	2.57 .96	3.07	.031
Understand the best time to market different crops	2.19 .74	2.37 1.12	2.25 1.01	3.10 1.10	3.54	.017
Identify various sources of crops market information	2.07 .68	2.06 .98	1.75 .78	2.42 1.12	1.78	.154
Understand future markets and contracts	2.11 .76	1.65 .82	1.45 .68	2.57 1.10	7.76	.001
Know best route and most economical transportation from farm to market	2.30 .83	2.53 1.36	2.20 1.10	3.36 1.06	4.34	.006
Overall mean	2.23 .44	2.39 .84	2.21 .83	2.97 .67	4.90	.003

farmers. Differences existed between all four groups. Therefore, the null hypothesis was rejected.

It can be concluded that farmers who had a high school education or more rated most of the competencies significantly higher than the groups who had lower educational levels. The educational level of the farmers did make a difference in the degree of economic competence possessed by the farmers.

Tables 16 and 17 analyzes the competencies needed and possessed by farmers when grouped by tenancy status. Highly significant difference (0.01 level) was observed for most of the competencies. Therefore, the null hypothesis was rejected. The three economic competencies needed by farmers that had no significant differences were: (1) use weather information to reduce risk in crop harvesting; (2) label varieties of crop; and (3) collect and interpret crops market information.

Similarly, the mean possessed score for five economic competencies had no significant difference (Table 17) when farmers were grouped by tenancy status. These were: (1) calculate the quantity of seed needed to plant a fixed number of crops; (2) package the crop when needed for sale; (3) go to market with the crops; (4) loading and unloading the crop; and (5) understand future markets and contracts.

Highly significant differences (0.01 level) existed among the overall mean for economic competencies needed and

possessed when farmers were grouped by tenancy status. Therefore, the null hypothesis was rejected. In general, the owner-landlord group rated competencies needed and possessed significantly higher than the other groups.

Table 16. Test for significant differences in economic competencies needed when farmers were grouped by tenancy status

Competency	Tenancy status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Select profitable crops	4.19 .57	4.30 .75	3.38 .76	4.62 .54	12.95	.001
Select sites suitable for crops	4.13 .54	4.30 .75	3.38 .65	4.42 .55	10.07	.001
Schedule plantings at proper time	4.13 .68	4.30 .75	3.46 .66	4.45 .61	7.31	.001
Calculate the quantity of seed needed to plant a fixed number of acres	4.22 .68	4.23 .83	3.53 .66	4.40 .55	5.49	.001
Understand the importance of crop rotation	4.22 .72	4.30 .75	3.38 .50	4.51 .50	10.27	.001
Analyze different ways to buy fertilizer	4.11 .74	3.76 .59	3.15 .37	4.31 .71	9.99	.001
Determine appropriate method of harvesting to minimize cost	4.27 .70	4.07 .75	3.38 .65	4.22 .64	5.97	.001
Keep and analyze production records for the crops	4.69 .57	4.23 .83	3.53 .87	4.28 .75	8.41	.001

[a]1 = Group 1, Owner-operator;
2 = Group 2, Owner-tenant;
3 = Group 3, Tenant;
4 = Group 4, Owner-landlord.

Table 16. Continued

Competency	Tenancy status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Budget the annual cost and return in crop production	4.50 .69	4.15 .89	3.30 .75	4.45 .61	10.30	.001
Analyze future production	4.25 .69	3.92 .86	3.07 .64	4.11 .83	7.93	.003
Determine results obtained from adoption of new varieties of crops	4.08 .73	3.92 .75	3.23 .59	4.14 .84	4.93	.004
Adjust production techniques based on latest research findings	4.00 .67	3.76 .92	3.23 .59	4.20 .96	4.69	.001
Understand price support policy and government subsidies on various inputs and outputs	3.88 .78	4.07 .75	3.23 .59	4.28 .92	5.49	.001
Evaluate economic impact of careless crop handling	4.16 .73	4.07 .64	3.38 .76	4.42 .73	6.50	.001
Improve knowledge of crop production through various sources	4.05 .62	3.92 1.03	3.30 .63	4.31 .75	5.93	.001
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	4.19 .66	4.00 .91	3.23 .59	4.42 .55	10.70	.001

Table 16. Continued

Competency	Tenancy status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Have mathematical abilities (can add, subtract, multiply, and divide)	4.50 .65	4.38 .76	3.30 1.03	4.22 .91	6.88	.001
Determine fertilization rates required for maximum yield	4.16 .65	4.23 .72	3.23 .59	4.22 .91	6.17	.001
Use weather information to reduce risk in crop harvesting	3.86 .89	4.00 .70	3.30 .48	3.94 .93	2.03	.114
Describe the problems involved in marketing various crops	4.19 .74	3.76 .83	3.30 .63	3.91 .88	4.10	.008
Provide financing through credit agencies	4.27 .70	4.00 .57	3.46 .77	4.22 .77	4.54	.005
Determine the benefit of owning or renting farm machinery	4.36 .72	3.92 .64	3.30 .75	4.45 .65	10.12	.001
Understand how to use credit	4.25 .64	3.92 .64	3.38 .65	4.42 .60	9.43	.001
Label varieties of crop	3.91 .77	3.84 .89	3.23 .59	4.00 1.00	2.67	.051
Determine the methods of selling crops	3.83 .69	4.00 .70	3.15 .68	4.08 .70	5.82	.001
Aware of seasonal price changes	3.94 .75	3.76 .72	3.23 .59	4.34 .68	8.36	.001
Make grades of the crop to meet the market standards	3.86 .68	3.76 .92	3.38 .76	4.14 .77	3.31	.023

Table 16. Continued

Competency	Tenancy status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Package the crop when needed for sale	3.86 .72	3.84 .68	3.38 .65	4.20 .86	3.77	.013
Use proper storage for crops	3.88 .82	3.76 .92	3.46 .77	4.42 .69	6.08	.001
Go to the market with the crops	3.77 .76	3.92 .64	3.30 .63	4.11 .86	3.64	.015
Loading and unloading the crop	3.77 .72	3.76 .72	3.38 .65	4.05 .72	2.95	.036
Treat stored crops for pest control	3.80 .82	3.69 .63	3.46 .77	4.11 .67	2.90	.038
Collect and interpret crop market information	3.75 .77	3.76 .83	3.30 .63	4.00 .93	2.24	.088
Understand the best time to market different crops	4.36 .76	4.00 .70	3.30 .63	4.25 .91	5.96	.001
Identify various sources of crops market information	4.00 .75	3.84 .89	3.15 .55	4.02 .98	3.81	.012
Understand future markets and contracts	3.91 .93	3.53 .96	3.07 .64	3.97 .98	3.54	.017
Know best route and most economical transportation from farm to market	4.05 .71	3.84 .80	3.15 .37	4.22 .94	6.18	.001
Overall mean	4.09 .47	3.97 .59	3.31 .50	4.24 .55	10.11	.001

Table 17. Test for significant differences in economic competencies possessed when farmers were grouped by tenancy status

Competency	Tenancy status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Select profitable crops	2.97 .99	2.69 1.03	2.00 .81	3.37 .91	6.95	.001
Select sites suitable for crops	2.80 1.11	2.30 .94	1.84 .89	3.08 1.86	5.14	.002
Schedule plantings at proper time	2.88 .94	2.61 1.04	2.07 .95	3.20 1.05	4.26	.007
Calculate the quantity of seed needed to plant a fixed number of acres	2.86 .83	2.92 .86	2.38 1.12	3.14 .91	2.25	.087
Understand the importance of crop rotation	2.61 .87	2.30 .63	1.84 .68	2.97 .95	6.07	.001
Analyze different ways to buy fertilizer	2.58 .90	2.00 .70	1.61 .65	2.54 1.06	4.68	.004
Determine appropriate method of harvesting to minimize cost	2.86 .93	2.07 1.03	1.61 .65	2.88 1.13	7.24	.001
Keep and analyze production records for the crops	2.44 .80	1.84 .89	1.38 .50	2.77 1.11	8.74	.001

[a]1 = Group 1, Owner-operator;
2 = Group 2, Owner-tenant;
3 = Group 3, Tenant;
4 = Group 4, Owner-landlord.

Table 17. Continued

Competency	Tenancy status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Budget the annual cost and return in crop production	2.47 .99	2.23 1.09	1.46 .66	2.68 1.07	4.88	.003
Analyze future production	2.41 .90	2.07 .86	1.38 .50	2.51 1.09	5.14	.002
Determine results obtained from adoption of new varieties of crops	2.44 .87	1.92 .64	1.61 .65	2.68 1.05	5.68	.001
Adjust production techniques based on latest research findings	2.25 .73	1.92 .64	1.38 .50	2.65 1.28	6.34	.001
Understand price support policy and government subsidies on various inputs and outputs	2.36 .96	1.84 .80	1.30 .48	2.31 1.18	4.44	.005
Evaluate economic impact of careless crop handling	2.44 .84	2.30 .94	1.61 .76	2.82 1.22	4.74	.004
Improve knowledge of crop production through various sources	2.41 .80	2.46 .77	1.69 .63	2.94 .93	7.47	.001
Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns	2.44 .80	2.38 .65	1.69 .63	2.91 .95	7.21	.001

Table 17. Continued

Competency	Tenancy Status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Have mathematical abilities (can add, subtract, multiply, and divide)	2.63 1.22	1.92 1.18	1.46 .52	2.91 1.44	5.41	.001
Determine fertilization rates required for maximum yield	2.69 .92	2.23 1.09	1.76 .83	2.97 1.24	4.68	.004
Use weather information to reduce risk in crop harvesting	2.25 .87	1.84 .89	1.46 .66	2.34 1.10	3.32	.023
Describe the problems involved in marketing various crops	2.47 .90	1.92 .64	1.46 .51	2.65 1.32	5.25	.002
Provide financing through credit agencies	2.52 .73	2.61 .76	1.46 .66	3.00 .90	11.78	.001
Determine the benefit of owning or renting farm machinery	2.77 .76	2.46 .77	1.69 .66	3.14 .87	11.11	.001
Understand how to use credit	2.75 .73	2.76 .83	2.00 .81	3.14 1.08	5.15	.002
Label varieties of crop	2.30 .92	1.69 .94	1.53 .66	2.28 1.17	2.99	.034
Determine the methods of selling crops	2.44 1.05	2.00 .91	1.53 .66	2.68 1.32	3.93	.010
Aware of seasonal price changes	2.47 1.05	1.69 .75	1.61 .76	2.62 1.28	4.47	.005
Make grades of the crop to meet the market standards	2.36 .83	1.69 .75	1.61 .65	2.14 1.06	3.21	.026

Table 17. Continued

Competency	Tenancy Status 1 N=36 Mean S.D.	2 N=13 Mean S.D.	3 N=13 Mean S.D.	4[a] N=35 Mean S.D.	F-ratio	F-prob.
Package the crop when needed for sale	2.36 .93	1.84 .87	1.69 .63	2.42 1.21	2.44	.069
Use proper storage for crops	2.63 .99	2.30 .48	1.92 .64	2.88 .93	4.31	.006
Go to the market with the crops	2.50 .91	2.38 .76	2.30 .63	2.65 1.02	.60	.614
Loading and unloading the crop	2.55 .84	2.15 .68	2.15 .80	2.62 1.05	1.51	.215
Treat stored crops for pest control	2.27 .84	2.15 .98	1.69 .75	2.68 .93	4.32	.006
Collect and interpret crop market information	2.27 .91	1.46 .66	1.46 .77	2.17 1.09	4.23	.007
Understand the best time to market different crops	2.61 .90	2.15 1.06	1.61 .65	2.68 1.15	4.36	.006
Identify various sources of crops market information	2.22 .76	1.76 .92	1.53 .51	2.22 1.08	2.75	.047
Understand future markets and contracts	2.08 .80	1.69 .94	1.46 .66	2.00 1.02	1.90	.134
Know best route and most economical transportation from farm to market	2.80 1.14	2.46 .87	1.53 .51	2.74 1.33	4.44	.005
Overall mean	2.52 .61	2.13 .64	1.67 .41	2.71 .84	8.17	.001

CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Agricultural efficiency and productivity depend largely upon the input and investment in agriculture and in the methods of production. Progressive agriculture demands improvement in input and technology, irrigation, improved seeds, chemical fertilizers, land reclamation and soil conservation, plant protection, mechanization, and favorable institutional and organizational structure. There is no doubt that these inputs play an important role; but the farmer, who is the major decision maker, has to decide:

-what to produce

-how much to produce

-when to produce

-how to produce.

Therefore, the economic decisions made by the farmer are very important in the farming business. Wise decisions result in higher productivity which eventually lead to self sufficiency of food production. This analysis of economic competencies needed and possessed by farmers should be useful in planning instructional programs related to crop production and marketing by extension personnel in Hyderabad District, Sind, Pakistan.

One of the main problems of agriculture in Pakistan is low productivity. The vicious circle of poverty in agriculture starts from the point of low agricultural production and

follows through with low marketable surpluses, low income, low savings, low investments for land improvement and ultimately ends in low agricultural production. Each factor reacts cumulatively upon another in such a way that perpetuates poverty. Basic factors which account for retarding the growth of agricultural production can be classified under three categories: (1) natural, (2) techno-economic, and (3) socio-economic factors. These factors have profound influence on shaping agricultural policy. However, a continuous increase in food grain production is of utmost urgency.

The primary purpose of this study was to identify the economic competencies needed and possessed by farmers in Hyderabad District, Sind, Pakistan.

The specific objectives of the study were:

1. To identify selected characteristics of farmers and agriculture officers in Hyderabad District, Sind, Pakistan.
2. To determine the degree to which economic competencies are needed and possessed by the farmers.
3. To compare the perceptions of farmers and agriculture officers regarding the degree of competence needed and the degree of competence possessed by farmers.
4. To compare the degree of competence needed and the degree of competence possessed when farmers are grouped by selected demographic factors.

The following null hypotheses were formulated for this study. The hypotheses were tested at the 0.05 alpha level.

1. There are no significant differences in the degree of economic competence needed and possessed as perceived by the farmers.
2. There are no significant differences in the degree of economic competence needed and possessed as perceived by the agriculture officers.
3. There are no significant differences between the perceptions of the farmers and agriculture officers regarding economic competencies needed by farmers.
4. There are no significant differences between the perceptions of the farmers and agriculture officers regarding economic competencies possessed by farmers.
5. There are no significant differences in the perceptions of the farmers regarding economic competencies needed and possessed when grouped according to:
    1) educational level,
    2) years of farming experience, and
    3) tenancy status.

Synopsis of the Procedure

The target population for this study consisted of farmers and agriculture (extension) officers in Hyderabad District, Sind, Pakistan. The first group consisted of 100 randomly selected farmers, twenty-five from each of the four

talukas in the district. Three people refused to participate; thus, data were collected from 97 farmers. All twenty-six of the agriculture officers in the area participated in the study.

Thirty-seven competency statements constituted the economic competencies portion of the questionnaire. A 1-5 point response scale was used to assess the degree of competence needed and the degree of competence possessed by farmers for each of 37 competencies included in the questionnaire.

The instrument was also designed to gather data related to the demographic characteristics of each group. These variables included land ownership, education, years of work experience, employment of hired workers, livestock owned and the number of dependent family members. The questionnaire also gathered data regarding sources of information used by farmers. The instrument was field tested and checked for content validity by agriculture officials in Pakistan. The data were collected through personal interviews with farmers and agriculture officers included in the sample. Approximately forty-five minutes were required to conduct each interview.

Appropriate statistical procedures from the Statistical Program for the Social Sciences (SPSSx) were employed in analyzing the data. Programs used included RELIABILITY,

FREQUENCIES, PAIRED T-TEST, T-TEST, and ONE-WAY ANALYSIS OF VARIANCE.

Reliability of the questionnaire was tested and high Cronbach's alpha scores were observed for the economic competencies needed and possessed by farmers, revealing that farmers and agriculture officers tended to respond to an item within the questionnaire similarly to other items in the questionnaire.

Conclusions

The study investigated the characteristics of the farmers in Hyderabad District, Sind, Pakistan. The following is a profile of these farmers:

- most (83.5 percent) of farmers were married
- more than one-third of farmers operated their own land
- only 13.4 percent of the farmers rented all their land on a share basis
- slightly over one-fourth of the farmers were illiterate
- thirty-two percent of the farmers had only a primary education
- the mean years of farming experience was 18.22
- a majority (69 percent) had farmed from 1 to 20 years
- the mean size of the farm families was 4.8
- about one-third of the farmers owned 25 acres or less of the land they farmed

- the mean acres of land owned by farmers was 51
- slightly over 10 percent of the farmers owned over 100 acres
- most of the farmers (90.7 percent) rented 25 or less acres of land
- the mean acres rented by farmers was 21
- about 32 percent of the farmers did not employ workers on their farms
- a majority (sixty percent) of farmers had 1 to 3 full-time hired workers
- most farmers (81 percent) owned 10 or less animals
- the mean number of animals owned by farmer was approximately 7.

Most (80.8 percent) of the agricultural officers held the masters degree. Only 15 percent had received in-service training related to their extension work. The mean years of experience of agriculture officers was approximately 13. Sixty-five percent of agricultural officers had 12 or more years of extension experience.

Respondents named short courses as their first choice for receiving new farm information followed by agricultural demonstrations and farmer conferences. Extension workers were most frequently named by the farmers as the most suitable source of information for them. The agriculture officers identified the radio as the most suitable source for

delivering information to farmers followed by television and newspaper.

Farmers recognized the need for economic competencies related to their farming business. The overall mean score computed for degree of economic competence needed as perceived by farmers was 4.02 with .60 standard deviation. All of the competencies had "needed mean" of 3.75 or above out of a possible rating of 5.00 (very high competence needed). Twenty competencies had mean of 4.00 (high competence needed) and above.

The highest mean (4.33) for degree of competence needed by farmers was for "keep and analyze production record for the crops". The second highest needed mean (4.27) was for "budget the annual cost and return in crop production".

The identified need for economic competencies could be met through different programs. In this study farmers identified short courses organized by the Sind Agriculture University as a preferred delivery system. These courses should emphasize the economic competencies identified in this study.

None of the economic competencies had a possessed mean of 3.00 (moderate competence) as rated by farmers. Sixteen competencies had means between 2.50 and 2.94. The overall mean calculated for degree of competence possessed was 2.42, indicating limited competence in economic areas of farm business. The highest mean (2.94) for degree of competence pos-

sessed by the farmers was for "select profitable crops". The second highest mean (2.90) was for "calculate the quantity of seed needed to plant a fixed number of acres".

Only one competency had a mean lower than 2.00 (1.91) for competence possessed. This competency was "understand future markets and contracts".

The overall mean computed for degree of competence needed was 4.10 as perceived by agriculture officers. All of the competencies were rated above 3.50 out of a possible rating of 5.00. Twenty-seven competencies had a mean of 4.00 (high competence) and above; again indicating a strong need for economic competencies among the farmers.

Agriculture officers indicated that the greatest need among farmers was for "understand how to use credit", and "have mathematical abilities (can add, subtract, multiply and divide).

The highest mean (3.03) for degree of competence possessed by farmers as identified by agriculture officer was for "select profitable crops". The same competency had the highest possessed mean by farmers themselves. The overall mean computed for degree of economic competence possessed as perceived by the agriculture officers was 2.35. Only one competency was rated above 3.00 (moderate competence) out of a possible rating of 5.00. Eleven competencies had means between 2.50 and 3.00.

It can be concluded that farmers possess low economic competence, whereas they need high competence as identified by themselves and agriculture officers. These findings provide useful information for university personnel organizing short courses for farmers. The Extension department should emphasize these economic competencies while orienting new personnel to extension work. Special efforts should be made to provide agriculture officers with in-service training opportunities where these economic competencies should be developed.

A significant difference existed between the level of competence needed and possessed by farmers for all economic competencies included in the study. Farmers themselves indicated that all 37 competencies are needed, but that their level of competence is very limited. Therefore, it can be concluded that farmers need to improve their economic competencies as a means to improve their farming productivity.

Agriculture officers also recognized that farmers possessed less economic competence than they needed. A significant difference was observed between "needed" and "possessed" for all the competencies at 0.01 level. Again, it can be concluded that all the economic competencies were needed by the farmers, but that the level of competence possessed was very limited.

No significant difference existed between overall means of farmers and agriculture officers in the economic competencies needed and possessed by farmers. There was general consensus among the farmers and agriculture officers as to the economic competencies needed and possessed.

There was no significant difference in the overall mean for the economic competencies needed and possessed as perceived by farmers when grouped by years of farming experience. It was concluded that there was agreement on the degree of economic competence needed by farmers regardless of years of farming experience.

When farmers were grouped by educational level, significant differences were observed for several competencies. Of the 37 competencies, 20 needed and 25 possessed had significant differences between the group means. Farmers with a high school education or more tended to rate competencies significantly higher than farmers with lower levels of education.

The level needed and the level possessed for most of the economic competencies were significantly different at 0.01 level when farmers were grouped by tenancy status. A highly significant difference also existed among the overall means for economic competence needed and possessed. The owner-landlord group rated most competencies significantly higher than the owner-operator, tenant and owner-tenant groups.

Owner-landlords usually have more education than the other groups; thus, the difference in their rating's of these competencies.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

1. The findings of this study should be made available to the Sind Agriculture University and the Sind Agriculture Extension Department in the province of Sind.
2. Economic competencies should be incorporated into the curriculum of short courses organizing by the Sind Agriculture University.
3. The identified economic competencies should be emphasized in the Baccalaureate and Masters' degree programs at the Sind Agriculture University. This will ensure that the graduates who join the extension service as agriculture officers possess these economic competencies.
4. Sind Agriculture University should organize short courses with frequent intervals for farmers to emphasize economic competencies.
5. Sind Agriculture University and Sind Agriculture Extension Department should cooperate in organizing the in-service training for agriculture officers to enable them

to work with farmers in accordance with their competencies needed.

6. Extension workers were most frequently named as the most preferred source of information by farmers. Therefore, agriculture officers should plan programs to develop economic competencies among farmers.
7. Because the radio and television was perceived by respondents as an important source of information for farmers, extension should work closely with these media resources in planning educational programs for farmers. Since radio and television are under different administrative control, linkages between these agencies and extension should be encouraged to provide educational information for farmers.

Recommendations for Further Study

1. Research directed at determining the level of economic competence needed and possessed by farmer should be conducted in other provinces.
2. Research should be initiated to investigate the effectiveness of extension in meeting the needs of farmers for economic competencies.

Implications of the Study

To achieve economic efficiency, farmers needs to have proper education for utilizing their resources. The analysis

of economic competencies needed and possessed by farmers would help program planners establish new areas of adult/ rural education.

The study identified thirty-seven economic competencies needed and possessed by farmers. Farmers felt that they possessed low economic competence, whereas they needed high competence. This was verified in the study through the perceptions of agriculture officers of District Hyderabad.

Educators have a tremendous opportunity to help farmers become competent in management of their farm business. Therefore, it has been recommended that further educational programs be developed to enhance the economic competence of farmers. The study found that farmers preferred to receive the education through short courses, advise of agriculture officers and radio. Therefore, organizers of educational programs should plan to use these delivery systems when possible.

The economic competencies could be grouped into clusters and short courses planned in the fields of record keeping, production planning, farm management, product harvest, marketing products, and proper storage of products. Programs should be structured in such a way as to meet the needs of farmers.

Educational programs focusing on economic principles for farmers and agriculture officers could be organized by Sind

Agriculture University through the coordination of the Extension Department.

This study revealed that farmers look to the agriculture officers for assistance in developing economic competencies. However, it was observed that a large number of agriculture officers had no in-service training. In-service training should be provided to broaden the economic knowledge of agriculture officers. Sind Agriculture University should plan special training programs for these officers in the competencies identified by this study.

Finally, this study identified radio and television as beneficial media for farmer education; therefore, the government and extension agencies should develop a plan for organizing farmer education programs through these media.

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APPENDIX: QUESTIONNAIRES

QUESTIONNAIRE (FARMERS)

ECONOMIC COMPETENCIES NEEDED AND POSSESSED BY FARMERS IN HYDERABAD DISTRICT, SIND, PAKISTAN

SECTION I: BIOGRAPHICAL DATA

Please answer of the following questions:

CODE NO._____

1. Instructional level (highest level of education completed):
   -None
   -Primary
   -Secondary
   -High school
   -College
   -University

2. How many years have you been farming? _____

3. Do you own all of the land which you farm? ___yes ___no.

4. How many acres do you operate? Own _____ Rent _____ Total _____

5. What is the number of full-time hired workers you employ? _____

SECTION: II.

The following items in the questionnaire states a competency (skill, knowledge, ability). Please read each statement carefully and circle the number which you feel best.

1= Do not know 2= Little competence 3= Moderate competence
4= High competence 5= Very high competence

		Degree Competence Needed	Degree Competence Possessed
1.	Select profitable various crops.	1 2 3 4 5	1 2 3 4 5
2.	Select sites suitable for the crops.	1 2 3 4 5	1 2 3 4 5
3.	Schedule plantings at proper time.	1 2 3 4 5	1 2 3 4 5
4.	Calculate the quantity of seed needed to plant a fixed number of acres.	1 2 3 4 5	1 2 3 4 5
5.	Understand the importance of crop rotation.	1 2 3 4 5	1 2 3 4 5
6.	Analyze different ways to buy fertilizer.	1 2 3 4 5	1 2 3 4 5
7.	Determine appropriate method of harvesting to minimize cost.	1 2 3 4 5	1 2 3 4 5
8.	Keep and analyze production records for the crops.	1 2 3 4 5	1 2 3 4 5
9.	Budget the annual cost and return in crop production.	1 2 3 4 5	1 2 3 4 5
10.	Analyze future production.	1 2 3 4 5	1 2 3 4 5
11.	Determine results obtained from adoption of new varieties of crops.	1 2 3 4 5	1 2 3 4 5
12.	Adjust production techniques based on latest research findings	1 2 3 4 5	1 2 3 4 5
13.	Understand price support policy and government subsidies on various inputs and outputs.	1 2 3 4 5	1 2 3 4 5
14.	Evaluate economic impact of careless crop handling.	1 2 3 4 5	1 2 3 4 5
15.	Improve knowledge of crop production through various sources.	1 2 3 4 5	1 2 3 4 5
16.	Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns.	1 2 3 4 5	1 2 3 4 5
17.	Have mathematical abilities, can add, subtract, multiply, and divide.	1 2 3 4 5	1 2 3 4 5
18.	Determine fertilization rates required for maximum yield.	1 2 3 4 5	1 2 3 4 5
19.	Use weather information to reduce risk in crop harvesting.	1 2 3 4 5	1 2 3 4 5
20.	Describe the problems involved in marketing various crops.	1 2 3 4 5	1 2 3 4 5

21.	Provide financing through credit agencies.	1 2 3 4 5	1 2 3 4 5
22.	Determine the benefit of owing or renting the farm machinery.	1 2 3 4 5	1 2 3 4 5
23.	Understand how to use credit.	1 2 3 4 5	1 2 3 4 5
24.	Label varieties of crop.	1 2 3 4 5	1 2 3 4 5
25.	Determine the methods of selling the crops.	1 2 3 4 5	1 2 3 4 5
26.	Aware of seasonal price changes.	1 2 3 4 5	1 2 3 4 5
27.	Make grades of the crop to meet the market standards for sale.	1 2 3 4 5	1 2 3 4 5
28.	Package the crop where needed for sale.	1 2 3 4 5	1 2 3 4 5
29.	Use proper storage for the crops.	1 2 3 4 5	1 2 3 4 5
30.	Go to the market with the crops.	1 2 3 4 5	1 2 3 4 5
31.	Loading and unloading the crop.	1 2 3 4 5	1 2 3 4 5
32.	Treat stored crops for pest control.	1 2 3 4 5	1 2 3 4 5
33.	Collect and interpret the crops market information.	1 2 3 4 5	1 2 3 4 5
34.	Understand the best time for different crops to market.	1 2 3 4 5	1 2 3 4 5
35.	Identify various sources of crops market information.	1 2 3 4 5	1 2 3 4 5
36.	Understand future market and contracts.	1 2 3 4 5	1 2 3 4 5
37.	Know best route and economy transport from farm to market.	1 2 3 4 5	1 2 3 4 5

38. In your opinion which is the best place to get education:

    1. High school _____
    2. Agriculture college _____
    3. Agricultural university _____
    4. Other _____

39. In your opinion what kind of educational programs would benefit you:

    1. Short course _____
    2. Adult evening or day classes _____
    3. Conferences for farmers _____
    4. Agricultural demonstrations _____
    3. Other _____

40. In your opinion what source of information is most useful in the field of agriculture:

    1. Radio _____
    2. Extension worker _____
    3. T. V. _____
    4. Newspaper_____/Magazines_____/News letters
    3. Other_____

41. In your opinion what programs government should plan for your benefit:

    1. _____
    2. _____
    3. _____
    4. _____

42. In your opinion what kind of services Extension personnel should perform:

    1. _____
    2. _____
    3. _____
    4. _____

QUESTIONNAIRE (AGRICULTURE OFFICERS)

ECONOMIC COMPETENCIES NEEDED AND POSSESSED BY FARMERS IN HYDERABAD DISTRICT, SIND, PAKISTAN

SECTION I: BIOGRAPHICAL DATA

Please answer of the following questions:

CODE NO. _____

1. Instructional level (highest level of education completed):

   _____

2. How many years have you been working as extension worker?

   _____

SECTION: II.

The following items in the questionnaire states a competency (skill, knowledge, ability). Please read each statement carefully and circle the number which you feel best about the farmer of your area.

1= Do not know 2= Little competence 3= Moderate competence
4= High competence 5= Very high competence

		Degree Competence Needed	Degree Competence Possessed
1.	Select profitable various crops.	1 2 3 4 5	1 2 3 4 5
2.	Select sites suitable for the crops.	1 2 3 4 5	1 2 3 4 5
3.	Schedule plantings at proper time.	1 2 3 4 5	1 2 3 4 5
4.	Calculate the quantity of seed needed to plant a fixed number of acres.	1 2 3 4 5	1 2 3 4 5
5.	Understand the importance of crop rotation.	1 2 3 4 5	1 2 3 4 5
6.	Analyze different ways to buy fertilizer.	1 2 3 4 5	1 2 3 4 5

7.	Determine appropriate method of harvesting to minimize cost.	1 2 3 4 5	1 2 3 4 5
8.	Keep and analyze production records for the crops.	1 2 3 4 5	1 2 3 4 5
9.	Budget the annual cost and return in crop production.	1 2 3 4 5	1 2 3 4 5
10.	Analyze future production.	1 2 3 4 5	1 2 3 4 5
11.	Determine results obtained from adoption of new varieties of crops.	1 2 3 4 5	1 2 3 4 5
12.	Adjust production techniques based on latest research findings.	1 2 3 4 5	1 2 3 4 5
13.	Understand price support policy and government subsidies on various inputs and outputs.	1 2 3 4 5	1 2 3 4 5
14.	Evaluate economic impact of careless crop handling.	1 2 3 4 5	1 2 3 4 5
15.	Improve knowledge of crop production through various sources.	1 2 3 4 5	1 2 3 4 5
16.	Adjust inputs (labor, machinery, fertilizer, chemicals, etc.) based on relative costs and returns.	1 2 3 4 5	1 2 3 4 5
17.	Have mathematical abilities, can add, subtract, multiply, and divide.	1 2 3 4 5	1 2 3 4 5
18.	Determine fertilization rates required for maximum yield.	1 2 3 4 5	1 2 3 4 5
19.	Use weather information to reduce risk in crop harvesting.	1 2 3 4 5	1 2 3 4 5
20.	Describe the problems involved in marketing various crops.	1 2 3 4 5	1 2 3 4 5
21.	Provide financing through credit agencies.	1 2 3 4 5	1 2 3 4 5
22.	Determine the benefit of owing or renting the farm machinery.	1 2 3 4 5	1 2 3 4 5
23.	Understand how to use credit.	1 2 3 4 5	1 2 3 4 5
24.	Label varieties of crop.	1 2 3 4 5	1 2 3 4 5
25.	Determine the methods of selling the crops.	1 2 3 4 5	1 2 3 4 5
26.	Aware of seasonal price changes.	1 2 3 4 5	1 2 3 4 5
27.	Make grades of the crop to meet the market standards for sale.	1 2 3 4 5	1 2 3 4 5
28.	Package the crop where needed for sale.	1 2 3 4 5	1 2 3 4 5
29.	Use proper storage for the crops.	1 2 3 4 5	1 2 3 4 5
30.	Go to the market with the crops.	1 2 3 4 5	1 2 3 4 5
31.	Loading and unloading the crop.	1 2 3 4 5	1 2 3 4 5
32.	Treat stored crops for pest control.	1 2 3 4 5	1 2 3 4 5

33.	Collect and interpret the crops market information.	1 2 3 4 5	1 2 3 4 5
34.	Understand the best time for different crops to market.	1 2 3 4 5	1 2 3 4 5
35.	Identify various sources of crops market information.	1 2 3 4 5	1 2 3 4 5
36.	Understand future market and contracts.	1 2 3 4 5	1 2 3 4 5
37.	Know best route and economy transport from farm to market.	1 2 3 4 5	1 2 3 4 5

38. In your opinion what is the best place to educate the farmers.

1. High school _____
2. Agricultural college _____
3. Agricultural university _____
4. Other _____

39. In your opinion what kind of education would benefit the farmers:

1. Short courses _____
2. Adult evening or day classes _____
3. Conferences for farmers _____
4. Agricultural demonstration _____

40. In your opinion what source of information would benefit the farmers:

1. Radio _____
2. T. V. _____
3. Newspaper_____/Magazine_____/Newsletter_____
4. Other _____

41. In your opinion what programs government should plan for benefit of farmers:

1. _____
2. _____
3. _____
4. _____

42. What kind of services you are offering to farmers:

1. _____
2. _____
3. _____
4. _____